NATIONAL MUSEUM OF VICTORIA

THE JOURNAL of The Department OF AGRICULTURE

VICTORIA · · · AUSTRALIA

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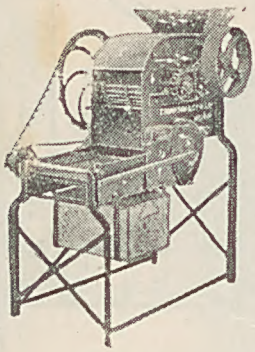

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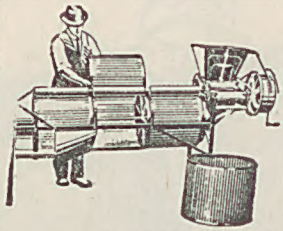

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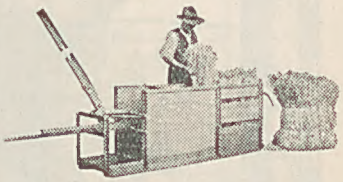

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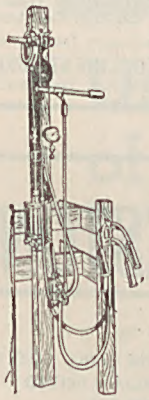

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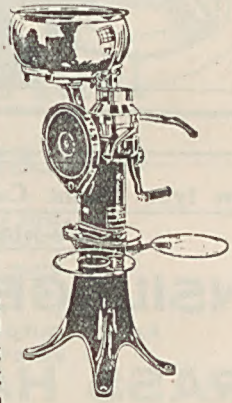

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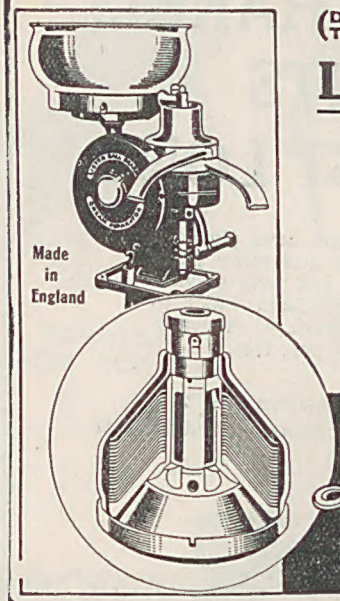

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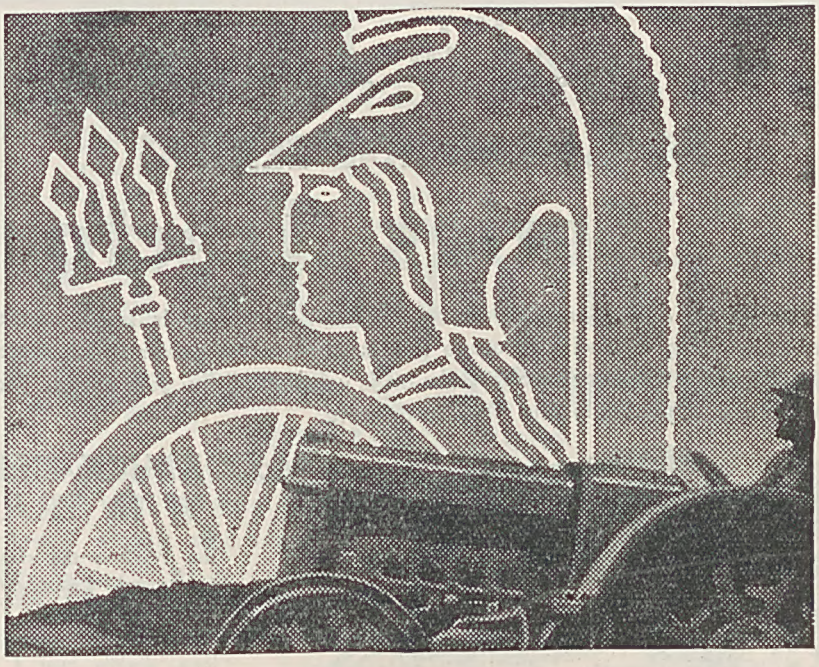

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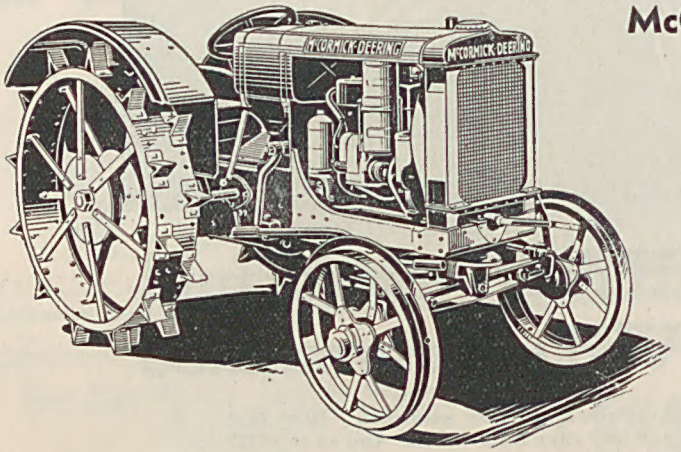

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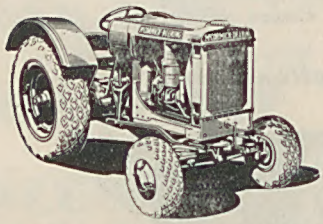

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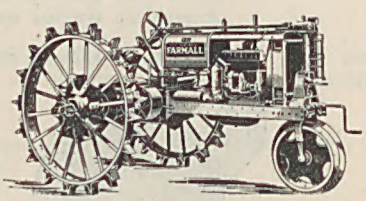
A handy tractor for orchard and general work, equipped with low-pressure pneumatic tyres. It negotiates soft, sandy soils, is compact in design and will work comfortably in close quarters. Machines such as sprayers can be operated by means of the power take-off and the belt pulley is very handy for miscellaneous belt work on the farm or orchard.



McCormick-Deering F-12 Tractor

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The McCormick-Deering F-12 tractor has a wide variety of uses—an all-purpose tractor for farm, orchard or vineyard work. It is especially suitable for use in row crops. It turns in a radius of 7 feet . . . handles any implement that can be handled by a four-horse team . . . supplies plenty of power for operating power-drive machines, through the power take-off.

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Don't use imitation parts in McCormick-Deering machines. If you do you risk getting poor quality and damaging your valuable asset. McCormick-Deering genuine spare parts are the only reliable parts you can use. They will fit and wear exactly like the originals.

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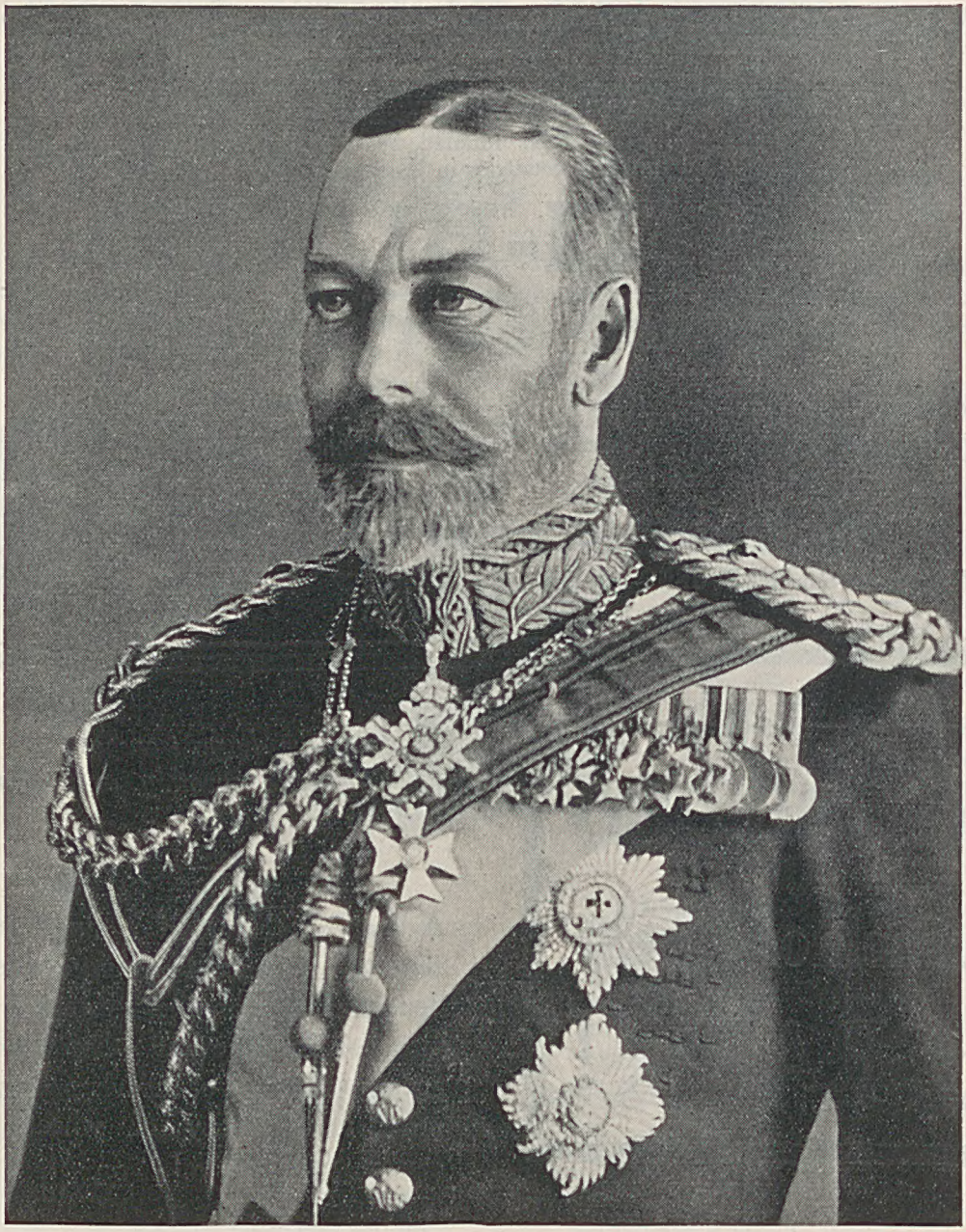

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The Journal of the DEPARTMENT of AGRICULTURE of VICTORIA

Dairy Farm Competition

State Wide Contest

By W. J. Yuill, Senior Dairy Supervisor

IN the spring of 1930 the Council of the Victorian United Cow Test Association inaugurated a State-wide Dairy Farm Competition, and although since then the dairy industry in Victoria has passed through a very critical time, the competition has been held every year. It is true that there has not been a marked increase in the number of competitors; each year, however, brings out a number of new entrants, and it is known that some who have been unsuccessful are improving their farms with the intention of competing again.

Many instances could be given of the good that has been achieved by the competition, and I have no doubt there are others due to the competition, but whose origin cannot be traced. Mr. A. Stephen, Senior Dairy Supervisor, who has acted as one of the judges since the inception of the movement, says, "The success of the competition cannot be gauged merely by the number of entrants, but by the number who profit by the dissemination of valuable information which ensues."

Thousands of dairy-farmers have attended one or more of the field-days on leading farms in different parts of the State. Every spring the Central Council organizes a "get together" field-day for herd-testing dairy farmers, and at the 1935 fixture in the Kiewa Valley over 1,000 people were present. The farms inspected included those of Messrs. J. A. Ford, A. E. Barton, and A. Crosthwaite. All held places in the 1934 "champion four," and Mr. Ford was awarded the highest number of points for the year, and so secured the honour of the Champion Dairy Farm. Not only do large crowds attend the field-days, but individual farmers and parties at various times throughout the year visit some of the chief farms.

Since the first competition was held a great improvement has been noticed in the competing farms; this is particularly so in farm sub-division, pasture improvement, ensilage making, and fodder conservation. Very few of the farms are without hot water installation and a cream-cooling system. When there is no cooler 10 points are lost; if there is no dairy 25 points are deducted. The utilitarian and aesthetic value of trees is being realized, and newly-planted shelter-belts are to be seen on many of the competing farms.

The competition for the Zone Championship and possession of the C.F.C. Shield, which is awarded to the zone, the best four farms of which obtained the highest aggregate of points, was won by Zone 1 with Zone 3 in second place. This is the second year in succession that Zone 1 has been awarded the championship and once again it supplies also the champion farm, that award going to Mr. J. A. Ford of the Kiewa Valley Association with Mr. Haywood of the Casterton Association second.

The maximum number of points for farm lay-out is 50; for shade and shelter, 20; and for condition of equipment, sheds, &c., 30.

Competition for "Champion Zone" and Possession of C.F.C. Shield—Best Four Farms in Zone.

FIRST—ZONE 1.

J. A. Ford	850·7
R. McJ. Jamieson	807
S. D. Edwards	810
H. Hodgson	797
	3,264·7

SECOND—ZONE 3.

J. B. Watson	841·5
P. Freestone	836
J. W. Reid	800
G. Billingham	774·2
	3,251·7

Champion Farms.

(Prizes, £10 10s. and £5 5s., donated by Meggitt's Ltd.).

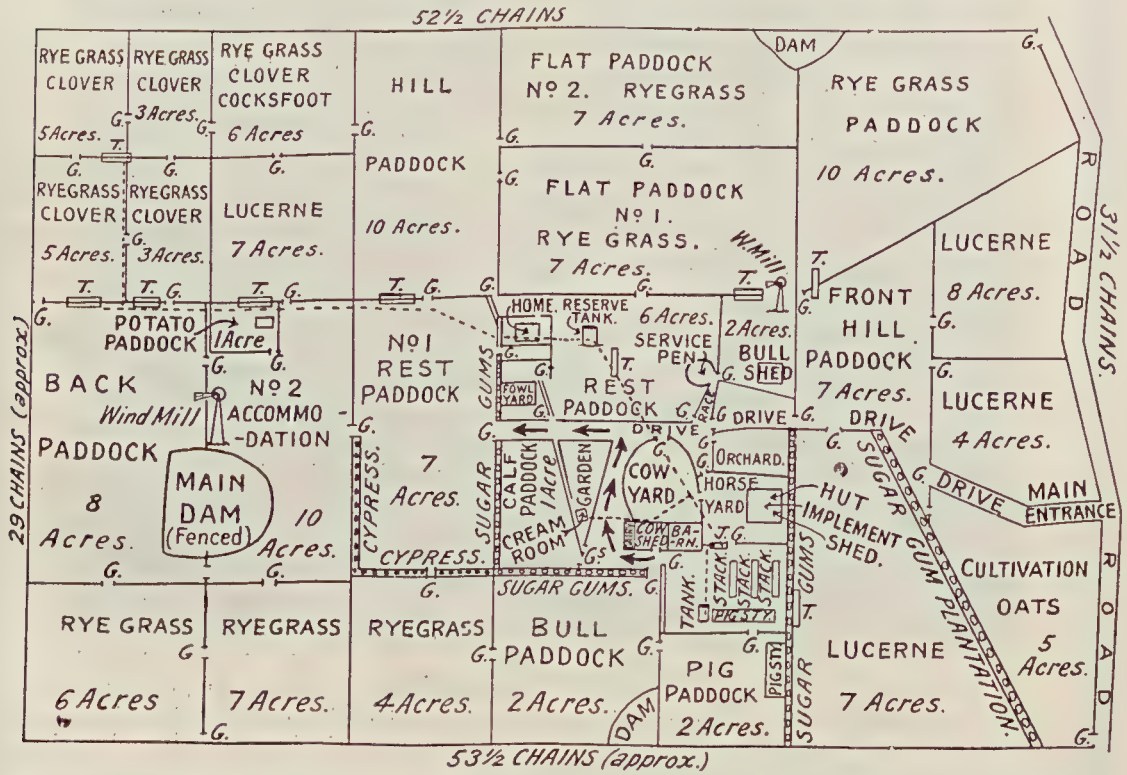
J. A. Ford, Kiewa Valley Association	850·7
H. Haywood, Casterton Association	845

The four leading competitors in Zone 1 will each receive a silver mounted blackwood miniature of the "C.F.C. Shield" as a lasting memento of the occasions.

Some of Mr. Haywood's young stock.

Messrs. J. A. Ford, of Kiewa Valley, H. Haywood, of Casterton, and J. B. Watson, of North Shepparton, each secured full points in this sub-section.

A plan of Mr. Haywood's property is shown on this page. What in 1913 was a bare, unfenced, treeless block is to-day a most comfortable farm. In every paddock there is permanent water. The total length of wind-breaks of gum-trees and cypress is a mile. Many of the gum-trees have been pollarded, and some of them are



The plan of Mr. H. Haywood's farm. The total area is 155 acres, 7 of which are occupied by the orchard, gardens, house, drives, yards, plantations, &c.

The dotted line indicates the water pipe course; T, trough; G, gate; and the route taken by the cows to the rest paddock is shown by the arrows.

at least 12 inches in diameter. Most of the farm's firewood is obtained from these trees.

An ample water supply has been made available by building a substantial embankment across the watercourse in a depression, and so impounding the surplus rain water. From the storage the water is carried to a 3,000-gallon storage tank on the high ground near the house, and from this point it is reticulated through an extensive system to tanks and troughs, while water can be had from several points about the house, sheds, yards, and piggeries. The total length of piping is 5,400 feet. Most of the troughs are about 20 feet in length, and were cut from huge tree-trunks about 3 feet in diameter. Ball-tap connexions are fitted to all troughs, which are set on the fence lines, and thus each one serves two paddocks.

Milking time at the farm of Mr. N. McLeod.

Mr. H. Parish, of Winchelsea, has, during recent times, greatly improved the lay-out and the water service of his farm. Water is impounded at the rear of the farm in the Wurdi Buluc swamp. A mill lifts supplies to a high tower from which they are reticulated throughout the farm. There are nine ball-tap troughs (four of the Candy type), which are placed on the line of division fences; each holds 300 gallons, and serves two paddocks. There are 22 points about the farm, sheds, gardens, pens, and dwelling. On the farm of Messrs. Horn Brothers and Coy. there are 42 taps, in addition to troughs and dams. In all, ten competitors were awarded the maximum 20 points for water supply.

One frequently hears severe comments on the comfortless homes of dairy farmers, but that any generalizing is wrong is proved by the beautiful homes seen in all the zones of this dairy competition. Fifty were allotted 17 or more of the possible 20 points; fifteen of these were awarded maximum points. The home and beautiful garden of Mr. A. T. James, of the Swanpool Association, deserve a special word of praise. Mr. W. J. O'Brien, of Moyhu; Mrs. Jenkins and W. Bligh, of Woodford; Mr. P. S. Grimwade, of Geelong; Mr. E. J. Pearce, and Messrs. Manson and Son, of Maffra, all have homes in which are to be found most of the conveniences of a modern suburban residence.

The attractive farm home of Mr. W. Bligh, Woodford Association.

There was a time when a farmer's bank-book was the only means of checking his income and expenditure; with some farmers this may still be so, but it is certainly not the case with entrants in the Victorian United Cow Test Association's Dairy Farm Competition. Mr. A. Holmes, Senior Dairy Supervisor, who judged zones 7 and 8, speaks very highly of the book-keeping methods on several of the farms in the Sale-Maffra area. Messrs. Pearce, Ross, Manson and Son, and Clyne of zone 7; Mr. A. Crosthwaite, of

Mr. Haywood's cream storage. The water used for cooling is later distributed to the garden.

zone 1; Messrs. Freestone and Reid, of zone 3; and Mr. E. C. Allchin, of zone 10, all were allotted full points. On these farms, and on several others where the maximum number of points was not quite deserved, no difficulty was experienced in obtaining data regarding farm revenue and outlay, and in nearly all cases the pedigrees of bulls and boars, and the production figures of cows were readily available.

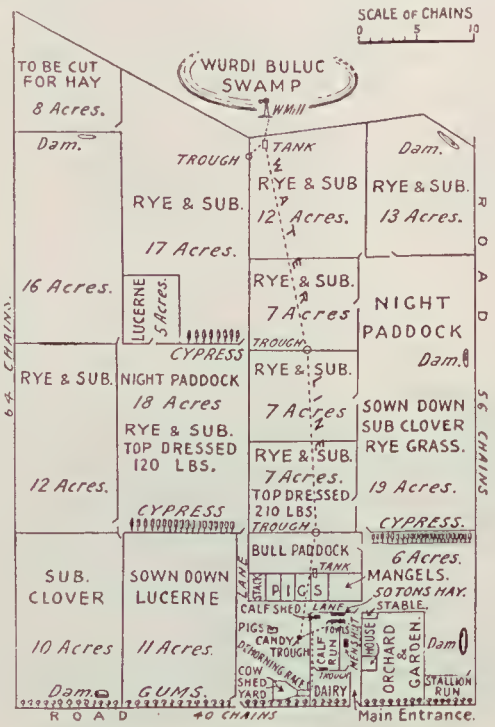
The various buildings, &c., comprised in section "C" are very important, and this section has always been a difficult one to judge. The maximum number of points that can be awarded is 105, made up of sheds, 12; yards, 7 gateways, 5; approaches, 5; drainage, 5; water-heating apparatus, 12; milking methods 10; separator, 7; dairy utensils, 7; dairy, 25; cooling system, 10. Excellent conditions may exist side by side with weaknesses. A shed may be perfect but for a bad drainage system; or, again, unsatisfactory milking methods may obtain where everything else is all that could be desired.

For steam under pressure one point more is allotted than where a sterilizer is installed, and a boiling water system, as a set-in copper, &c., good though it is, scores a point less than a sterilizer.

In this section Mr. H. Haywood, of Casterton, and Mr. A. E. Barton, of Kiewa, were each allotted 104 points. Mr. Barton was the only entrant to secure the full 70 points for dairy buildings. These buildings and the main posts in the fences are of concrete and the receiving and bailing yards have all been concreted; they were greatly admired by visitors to the Kiewa Field Day last September. Mr. Haywood's concrete-brick dairy contains an unusual feature in that sprinklers spray water on the surface of one wall and it enters a trough in which cans may be stood to about two-thirds of their depth. The water overflowing from the trough is carried to a garden surrounding the dairy. A cool temperature is maintained in the dairy, and dust and flies are effectively controlled.

Mr. A. T. James, of Swanpool, has selected a shady site under some high pines for his new dairy. Mr. Geo. Wilsher, of Winchelsea, has a concrete dairy that is a model. The same can be said of the dairies of Dr. Henderson, and Messrs. Grimwade, L. J. Tate, A. Crosthwaite and J. A. Ford.

For the herd sire a maximum of 50 points may be allotted, if he be registered and is of sound constitution and conforms to the type of his breed. Mr. A. Evans' Champion Red Poll, Mr. C. Dineen's Australian Illawarra Shorthorn and the Jersey bulls of Messrs. Wilsher, Stableford, and Bright all gained full honours. A total of 57 herd sires scored over 45 points each. The number set down as "under effective control" was 50. Competitors who secured full points were Messrs. Bunn, Share, Unthank and Sons, Pearce, Watson,



A plan of Mr. H. Parish's farm, a feature of which is the water service.

Freestone, Reid, Evans, Haywood, and Bright. Mr. Haywood has recently built a strong rotunda and a service pen; these give absolute control of his Jersey bull "Sil Sil of Banyule."

In the sub-section "Nominal Butter-fat per £100 Farm Value," an allowance of one-half the actual production is made to junior two-year-olds, one-third to senior two-year-olds, and one-seventh to three-year-olds. The yields and allowances are added to those of the cows over four years old, and the resulting figure is termed "nominal butter-fat." The yield of average nominal butter-fat per £100 of farm value is obtained, and one point is allotted for each 10 lb. The maximum number of points is 50, which is allotted when the yield averages 500 lb. or more butter-fat for every £100 of farm value. Where cheap grazing can be secured for growing stock and the whole of a farm devoted to the milking herd, very high returns are sometimes obtained; it was for this reason and in order that one section might not have an undue influence that it was decided not to give any advantage to herds obtaining a greater average than 500 lb.

Portion of Mr. G. Bright's herd.

An excellent stand of rye-grass on the farm of Mr. C. Sedgley.

In order that advantage might be given those herds where an increase in production was made, the section "Production of Junior Cows Over Mature Cows" was introduced. In six herds there was no increase in production; sixteen had less than 5 per cent., while seven showed an increase of over 20 per cent. A remarkable feature was that high production and low production herds were found in all zones. It was also observed that some herds in which non-registered and grade bulls were used gave returns just as high as the returns from herds in which registered bulls were used. There was only one instance where a man was depending on the market for his heifers. Generally a fine lot of selected heifers were being developed for the purpose of making good the inevitable herd depreciation.

Thirty-four of the herds secured 27 or more points out of a possible 30 points—15 for the herd, 10 for the sire, and 5 for the growing stock. Messrs. G. Bright, of Dumbalk and A. Evans, of Lima East were awarded the maximum; while Messrs. J. A. Ford, W. A.

Winners in Each of the Ten Zones, with Details of the Various Sections.

(* Denotes Winners of Previous Competition.)

Sections.	J. A. Ford,* Kilcwa Valley Association.	H. Haywood,* Casterton Association.	J. B. Watson,* North Shepparton Association.	Dr. J. L. and I. Henderson,* Mllawa Association.	T. E. Bond, Cohuna Association.	N. S. Terrier, Winchelsea Association.	Geo. Bright,* Dumbalk Association.	W. A. Beamish, Korumburra Association.	L. Senini, Narracan Association.	W. Swarbrick, Sale Association.
Layout of farm, &c.	100	100	100	95	91	85	95	90	92	97
Water supply	20	20	20	20	10	17	19	18	18	16
Bookkeeping	19	19	19	19	18	18	16	16	19	17
Home	20	16	19·5	19·5	16	19	20	18	20	17
Total Section "B" ..	159	155	158·5	153·5	135	139	150	142	149	147
Sheds, yards, drainage, &c. ..	69	69	64	67	51	64	65	60	50	59
Dairy and cream control ..	34	35	30	35	23	33	33	34	17	18
Total Section "C" ..	103	104	94	102	74	97	98	94	67	77
Herd sire	48	46	48	48	47	47	50	45	47	48
Production of ancestry ..	21·6	22	17	18	7	5	18·5	16	12	16·4
Nominal butter-fat per £100 farm value	50	42	50	50	50	50	41	48	50	50
Production of junior cows over mature	13·6	18	17	5	25	10	..	4	1	3·3
Inspection of stock	29	26	29	27	25	27	30	27	26	27
Proportion of junior cows to mature	20	14	23	30	23	25	8	17	9	9·2
Bull control	9·5	10	10	9	9	9	10	8	8	9
Total Section "D" ..	191·7	178	194	187	186	173	157·5	165	153	162·9
Pigs and housing	48	48	40	45	33	33	49	45	43	34
Poultry and housing	16	16	20	18	15	18	20	18	15	17
Total Section "E" ..	64	64	60	63	48	51	69	63	58	51
Farm carrying capacity ..	23·7	24	25	25	24·5	24·5	19	23	24·6	23·1
Condition of pastures, &c. ..	96	90	90	85	87	75	98	92	94	96
Reserves of fodder	50	50	50	50	44	50	50	50	50	50
Fertilizing	100	100	100	100	100	100	100	100	100	100
Total Section "F" ..	269·7	264	265	260	255·5	249·5	267	265	268·6	269·1
Section "G"—Net return per £100 of farm value	63·3	80	70	72·3	129	106·2	66	70	94·5	67·5
Grand Total	850·7	845	841·5	837·8	827·5	815·7	807·5	799	790·1	774·5

Anderson, F. Johnson, and Stableford were given only one point less.

On few of the farms was the breeding of pigs and poultry carried on in as satisfactory a way as could be wished. In some instances points were lost owing to an unregistered boar being used; in others the sows were not of good quality, and in a few cases points scored by well-bred stock were offset by indifferent housing.

Mr. Geo. Bright's Tamworth stud was allotted points only one short of the maximum, and his flock of Australorps received full points.

Mr. H. Parish, of Winchelsea, was close up with a fine lot of Large White pigs, and flocks

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Super Plume Ethyl

THE 5-POWER PETROL

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"Roseneath," the property of Mrs. D. H. Jenkins (Woodford Association), which gained first place in Sections "B" and "D".

of White Leghorns and Australorps. Both pigs and poultry were splendidly housed; the points awarded were two short of the maximum. Mr. J. Share, of Korumburra, received full points for his poultry, but his pigs were not quite up to the mark, and three points were lost. Messrs. J. A. Ford, H. Haywood, G. Wilsher, and Spencer were each allotted 48 points for pigs; while Messrs. A. Evans, J. B. Watson, and Horn Bros. and Co. secured maximum points for poultry. Messrs. H. E. Keele and Son, of Rochester, also scored well in this section.

Although the fodder reserves in Central and South Gippsland were much depleted during the winter, they had been built up again from the generous growth of last spring, and large reserves of ensilage, lucerne, and oaten and meadow hay are now held on most of the farms in that part of the State. Fifty were considered to have sufficient on hand for the year, that is, a ton of hay or three tons of ensilage per head of mature stock.

At Casterton Mr. Haywood has 25 acres of lucerne in five paddocks. Approximately 50 tons of hay is obtained from the first two cuts, and later the paddocks are grazed by the herd for a couple of hours each day. Upwards of 100 tons of hay was stocked on the farm when judging took place in January. Mr. N. S. Terrier had 120 tons of lucerne, oaten, and meadow hay. Mr. L. Senini had approximately 100 tons of ensilage and hay. Mr. C. Dineen, of Trafalgar, had a reserve of 30 tons of meadow hay, and a similar quantity of oaten hay, and 50 tons of maize ensilage. Mr. R. Jamieson, of Kiewa, had 150 tons of hay; and Dr. Henderson has very large reserves of meadow hay and ensilage. All the entrants except one from No. 1 zone had very extensive fodder reserves. Messrs. Barton and Ford each had unopened ensilage pits; filled during the previous year. Mr. J. Share, of Korumburra, had 200 tons of ensilage and 20 tons of meadow hay. Mr. W. Swarbrick, at Sale, depends largely on pit and stack ensilage, and had a large carry-over from the previous year,

Mr. G. Bright's herd sire.

Winning Farms in Section "B".

(A prize of 10 cwt. superphosphate, donated by Commonwealth Fertilizers & Chemicals Ltd, will be presented to the winner in each Zone).

Farm layout, 50 points; shade and shelter, 20 points condition of equipment, &c., 30 points; bookkeeping, 20 points; water system, 20 points; home, 20 points; maximum, 160 points.

Zone.	Name of Competitor.	Association.	Points.
1	Allan Crosthwaite ..	Kiewa Valley ..	151·5
2	W. J. O'Brien ..	Moyhu ..	139
3	J. W. Reid ..	North Murchison	145·5
4	J. D. Pierce ..	Rochester ..	145
5	Mrs. D. H. Jenkins	Woodford ..	151
6	Hy. Parish ..	Winchelsea ..	152·5
7	E. J. Pearce ..	Maffra ..	149
8	L. Senini ..	Narracan ..	149
9	W. D. Spencer ..	Leongatha ..	136
10	E. E. Allchin ..	Mountain View ..	143

Winning Farms in Section "C".

A "two-guinea order" donated by D. & W. Chandler, Ltd., Hardware Merchants, will be presented to the winner in each Zone.

Sheds, yards, gateways, approaches, drainage, water heating, milking methods, separator, utensils, milk and cream storage, cooling methods—maximum points, 105.

Zone.	Name of Competitor.	Association.	Points.
1	A. Barton ..	Kiewa Valley ..	104
2	A. T. James ..	Swanpool ..	100
3	J. W. Reid ..	North Murchison	97
4	C. A. Schier ..	Cohuna ..	90·5
5	L. J. Tate ..	Woodford ..	100
6	Geo. Wilsher ..	Winchelsea ..	100
7	A. G. and B. Clyne (No. 4 Farm)	Maffra ..	90
8	Chas. Dineen ..	Narracan ..	87
9	J. G. Howell and W. D. Spencer, equal	Leongatha ..	85
10	M. O. Bunn ..	Korumburra ..	96

Winning Farms in Section "D".

(A £2 2s. cash prize donated by the proprietors of *Live Stock Bulletin* will be presented to the winners.)

Registered sire and type, 50 points; production ancestry, 30 points; tested cows and production of nominal butter-fat per £100 of farm value, 50 points; production of junior cows over mature, 30 points; proportion of junior to mature cows, 30 points; inspection of herd, 30 points; bull control, 10 points; maximum points, 225.

Zone.	Name of Competitor.	Association.	Points.
1	H. Hodgson ..	Kiewa Valley ..	175·5
2	A. T. James ..	Swanpool ..	171·6
3	Geo. Billingham ..	North Shepparton	189·5
4	J. D. Pierce ..	Rochester ..	187·8
5	Mrs. D. H. Jenkins	Woodford ..	191
6	N. S. Terrier ..	Winchelsea ..	173
7	W. Swarbrick ..	Sale	162·9
8	F. Savige ..	Narracan ..	169·5
9	J. G. Howell ..	Leongatha ..	198
10	M. O. Bunn ..	Korumburra ..	196

Winning Farms in Section "E". (No prize).

Registered boar, 15 points; quality and appearance of herd, 25 points; housing and control, 10 points; poultry, 10 points; housing, 10 points; maximum points, 70.

Zone.	Name of Competitor.	Association.	Points.
1	J. A. Ford ..	Kiewa Valley ..	64
2	Dr. J. L. and I. Henderson	Milawa ..	63
3	J. B. Watson ..	North Shepparton	60
4	H. E. Keele and Son	Rochester ..	61
5	H. Haywood ..	Casterton ..	64
6	Hy. Parish ..	Winchelsea ..	68
7	A. G. and B. Clyne	Maffra ..	66
8	L. Senini ..	Narracan ..	58
9	Geo. Bright ..	Dumbalk ..	69
10	E. E. Allchin ..	Mountain View ..	67

Winning Farms in Section "F".

A prize of 10 cwt. of superphosphate donated by Commonwealth Fertilizer Co. will be presented to the winner.)

Farm value per cow, 30 points; fodder reserve, 50 points; pasture and legume areas, 100 points; fertilizing, 100 points; maximum points, 280.

Zone.	Name of Competitor.	Association.	Points.
1	A. Barton ..	Kiewa Valley ..	263·5
2	W. J. O'Brien ..	Moyhu ..	265·5
3	J. W. Reid ..	North Murchison	271
4	J. D. Pierce ..	Rochester ..	263
5	L. J. Tate ..	Woodford ..	262
6	R. W. Westbury ..	Ondit–Irrewarra	263·5
7	W. Swarbrick ..	Sale	279·1
8	L. Senini ..	Narracan ..	268·6
9	J. G. Howell ..	Leongatha ..	259
10	W. A. Beamish ..	Korumburra ..	265

Winning Farms in Section "G".

(A cash prize of £2 2s., presented by Capt. A. E. T. Payne.)

Maximum points, 180.

Zone.	Name of Competitor.	Association.	Points.
1	S. D. Edwards ..	Kiewa Valley ..	111·9
2	A. T. James ..	Swanpool ..	59·4
3	J. W. Reid ..	North Murchison	64·5
4	T. E. Bond ..	Cohuna ..	129
5	Wm. Henderson and Chas., Sedgley, equal	Woodford ..	90
6	J. H. B. Morris ..	Apollo Bay ..	108
7	A. G. and B. Clyne (No. 4 Farm)	Maffra ..	86
8	L. Senini ..	Narracan ..	94·5
9	J. G. Howell ..	Leongatha ..	78
10	F. Unthank and Son	Peninsula ..	78

as had Manson and Son on their No. 1 farm. On the farm of Mr. P. Treasure there was a reserve of 50 tons of lucerne and meadow hay. Mr. Stan Ross had a surplus of about 40 tons from the previous year; a similar quantity was stored on each of the farms of Messrs. Salagari, Clyne, and Stokel. In zone 3 Mr. P. Freestone had a carry-over of 50 tons of excellent meadow hay and first cut lucerne. Every competitor in Zone 4 was considered to have a "safety margin," consisting mostly of lucerne and meadow hay.

Hay making on the farm of Mr. G. Bright, Dumbalk.

The sub-section "Farm Carrying Capacity" is very important. It is remarkable that herds have been found in the competition averaging 300 lb. butter-fat on as low as £20 farm value and as high as £230 farm value. With such an extraordinary range it would appear that an average figure would be hard to obtain.

A survey of the farm values per cow, however, indicates that the average figures for the last two years were £75. To this figure must be added the cost of herd and sire, the team and all necessary equipment, utensils, and machinery, &c., before the farm becomes a going concern. Each cow must then produce her proportion of labour and farm running costs. Among the latter costs, including a miscellaneous list of items, from oil for the separator to bull replacement, is the important one of fertilizers. There is an old English saying that each dairy cow requires annually a bag of fertilizer on the land maintaining her, and it is known that a high-yielding cow removes annually from the farm in her milk the equivalent of the phosphoric acid contained in half a bag of superphosphate. Only eleven entrants in the last competition used less than a bag of superphosphate per dairy cow; on some farms upwards of two bags per cow were used.

When the returns of the farm are considered, the cost of fertilizers, concentrates,

One of Mr. G. Bright's brood sows with some of the young pigs.

Mr. L. Tate's cow shed.

agistment, hay, and water charges are deducted from the gross return from the dairy herd, pigs, calves sold off the bucket, and poultry. An allowance of 5 per cent. is made for the agistment of the team and the bull; thus if the farm value per cow be £100, an amount of £5 per animal is allowed for bull and team maintenance.

When all deductions are made the net returns are compared with the farm value. In this section one point is allowed for each £1 net return; thus if the net return is £15 for each £100 farm value, the number of points allotted would be fifteen, but to give more prominence to this section in the competition the final figure is multiplied by three; the number of points allotted then would be 45.

Some remarkably high figures were presented in this section, including those of Messrs. Roper, of the Kiewa Valley Association; J. H. B. Morris, of Apollo Bay; and N. S. Terrier, of Winchelsea; while Mr. P. Freestone, of North Murchison, showed a splendid return from his little irrigation farm.

Good returns were also obtained by Messrs. Jamieson and Hodgson, of Kiewa Valley; Dr. Henderson, of Milawa, and Messrs. Sedgley, of Woodford; and Senini, of Narracan. One of the outstanding performances was that af the Messrs. Clyne's large high-producing herd at Tinamba, where land values were the highest in the whole competition. Several other entrants also possessed very high-producing herds. It must not be overlooked, however, that a herd's average may be high, but because the herd is small the overhead cost may be very high; therefore the practice is to consider the butter-fat production of a farm rather than the actual average of the herd.

Summary of the Competition.

Of the competing farms, 13 exceeded 200 acres; 35 had an area of less than 150 acres. The smallest farms were those of Mr. Swarbrick, Sale (50 acres); Mr. P. Freestone, North Murchison (58 acres); Mr. J. D. Pierce, of Rochester (52 acres); and Mr. J. Semple, of Cohuna (50 acres). Acre values ranged from £5 at Apollo Bay to £45 at Tinamba; while farm-values per cow ranged from £20 to £120.

Thirty-seven farms were valued at more than £20 per acre. Of this number fourteen were valued at more than £30. Nineteen farms had values of less than £15 per acre. The income of the farm of Mr. Norris, at Apollo Bay, valued at £600, was £6 a week for the year. Nine farms were set down as worth £5,000, the highest being £7,200.

Returns varied largely because of the difference in the number of cows milked and the quality of the herds, and the greatest of all factors—management.

The highest return from any herd was that from the herd of Mr. W. Henderson, jun.; it amounted to £1,442.

The return of 44 herds exceeded £400. Of this number 31 exceeded £500; 28 were over £600; 20 over £700; 13 over £800; 10 over £900; while 4 exceeded £1,000.

Portion of Messrs. Keele & Son's herd of 40 grade Jerseys which averaged 380 lb. butter-fat.

[*Continued on page 70.*

The Agricultural Lime Act

Brands Registered for 1936

By W. C. Robertson, Chemist.

THE Agricultural Lime Act is similar to the Fertilizers Act in most respects, and provides that—(*a*) the brand must be registered at the office of the Director of Agriculture on or before the first day of November, or prior to sale in every year; (*b*) labels guaranteeing the quality of the agricultural lime, &c., must be affixed to each and every bag or parcel containing the lime; and (*c*) the vendor of any agricultural lime must give the purchaser a signed invoice certificate at the time of sale or before delivery. Penalties are fixed for non-compliance with, or infringement of, these provisions. A deficiency of 5 per cent. is allowed on the percentages of lime and fine material which are guaranteed.

In the accompanying table the brands of agricultural limes on the Victorian market for the current year are divided into three sections. viz.:—

1. Burnt lime (unslaked) (CaO).
2. Slaked lime ($CaCO_3.Ca(OH)_2$).
3. Ground limestone or chalk ($CaCO_3$).

A 30-foot outcrop of high-grade limestone on the banks of the Tyers river, Gippsland.

A view of the Lime Works at Cooper's Creek, Walhalla. The white patch in the distance is an immense heap of weather slaked lime which is being exploited.

15181.—3

This is necessary, because, while each form of lime is designated agricultural lime, there is a difference in the chemical structure of the compounds constituting these forms, and a decided variation in the lime content.

Burnt Lime.

Burnt lime consists mainly of calcium oxide, and is manufactured by heating (burning) limestone to a high temperature in suitable kilns, whereby the calcium carbonate ($CaCO_3$) of the limestone is broken up into lime (CaO) and carbonic acid gas (CO_2). The purity and strength of the burnt lime (CaO) under equal conditions of burning will depend upon the quality of the limestone (calcium carbonate) which is burnt.

LIST OF AGRICULTURAL LIMES REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE AGRICULTURAL LIME ACT 1934 (No. 4271) FOR THE YEAR 1936.

General Description.	Brand.	Calcium Oxide.	In the Form of—	Equivalent to Calcium Carbonate.	Magnesium Oxide.	In the Form of—	Degree of Fineness. Material Passing Through a 20-mesh Sieve.	Price per Ton in 11-ton Lots.	Manufacturer.
		%		%	%		%	£ s. d.	
Burnt Lime (unslaked)	Peninsula No. 3 (Powdered Quick Lime)	73·08	Mainly oxide	130·40	1·28	Mainly oxide	98·0	2 10 0	Peninsula Lime and Fertiliser Co. Pty. Ltd., 257 Burwood-road, Hawthorn
,, ,,	Kawa Oxide Lime	83·88	,,	149·71	1·17	,,	90·0	3 0 0	Alkemade Bros., 535 Little Lonsdale-street, Melbourne
,, ,,	Lilydale Ground Burnt Lime No. 2	70·00	,,	125·00	5·00	,,	40·0	2 10 0	David Mitchell Estate, Oliver's-lane, Melbourne
,, ,,	Lara Ground Burnt Lime	84·00	,,	150·00	1·50	,,	85·0	3 10 0	The Lara Fertiliser and Lime Co., A. J. Spalding, Lara Lake
Slaked Lime ..	Snowflake Agricultural	73·40	Mainly hydrate	131·10	1·80	Mainly hydrate	76·0	2 0 0	Evans Bros., Yarrabank-road, South Melbourne
,, ,, ..	Sweetsoil Snowflake Agricultural	73·40	,,	131·10	1·80	,,	76·0	2 0 0	,, ,, ,,
,, ,, ..	McCann's Agricultural	60·00	,,	107·00	1·10	,,	80·0	1 15 0	John N. McCann Pty. Ltd., Kardinia-street, Geelong
,, ,, ..	White Rock ..	67·10	,,	119·80	1·20	,,	72·0	2 5 0	White Rock Lime Co. Pty. Ltd., Cooper's Creek
,, ,, ..	Sweetsoil White Rock	67·10	,,	119·80	1·20	,,	72·0	2 5 0	White Rock Lime Co. Pty. Ltd., 19 Queen-street, Melbourne
,, ,, ..	Peninsula A.G. Agricultural	56·92	,,	101·60	0·99	,,	100·0	2 10 0	Peninsula Lime and Fertiliser Co. Pty. Ltd., 257 Burwood-road, Hawthorn
,, ,, ..	Lilydale Agricultural	68·00	,,	121·30	3·00	,,	70·0	3 0 0	David Mitchell Estate, Oliver's-lane, Melbourne
,, ,, ..	Bulldog Agricultural	51·80	,,	92·40	0·80	,,	65·0	2 5 0	Bulldog Lime Co. Pty. Ltd., 344 Swan-street, Richmond
,, ,, ..	Kawa ..	66·70	,,	119·10	1·20	,,	92·0	3 0 0	Alkemade Bros., 535 Little Lonsdale-street, Melbourne
,, ,, ..	Walker's Magic	44·80	,,	80·00	3·80	Hydrate and carbonate	75·0	2 10 0	Waverley Lime Works, Lara
Ground Limestone or Chalk	Deep-sea ..	46·70	Carbonate	83·40	2·50	Carbonate	85·0	1 0 0	Deepsea Stock Foods, 527 Collins-street, Melbourne
,, ,,	Lilydale ..	49·32	,,	88·00	2·00	,,	95·0	1 5 0	David Mitchell Estate, Oliver's-lane, Melbourne
,, ,,	Applim ..	51·10	,,	91·20	1·20	,,	98·0	1 5 0	Ammonia Products Pty. Ltd., 360 Collins-street, Melbourne
,, ,,	Star	55·90	,,	99·70	0·30	,,	99·0	1 8 6	Brunswick Plaster Mills Pty. Ltd., Tinning-street, Brunswick, N.10
,, ,,	Kawa ..	51·40	,,	91·70	1·20	,,	75·0	1 10 0	Alkemade Bros., 535 Little Lonsdale-street, Melbourne
	Walker's 1st Grade	42·00	,,	75·00	2·00	,,	75·0	1 5 0	Waverley Lime Works, Lara
,, ,,	Lara	45·00	,,	80·20	1·50	,,	75·0	1 10 0	The Lara Fertiliser and Lime Co., A. J. Spalding, Lara Lake
,, ,,	Bulldog ..	45·40	,,	80·90	0·80	,,	80·0	1 13 0	Bulldog Lime Co. Pty. Ltd., 344 Swan-street, Richmond
,, ,,	Kurdeez ..	44·80	,,	80·00	0·80	,,	65·0	1 13 0	Curdie's River Lime Co. Pty. Ltd., 422 Collins-street, Melbourne
,, ,,	Walker's No. 2 Grade	30·80	,,	55·00	3·00	,,	75·0	1 0 0	Waverley Lime Works, Lara
,, ,,	Shellime ..	39·20	,,	70·00	0·95	,,	60·0	1 5 0	Shellime Pty. Ltd., 414 Collins-street, Melbourne

Melbourne, 4th December, 1935.

W. R. JEWELL, M.Sc., F.I.C.,
Chemist for Agriculture.

Burnt lime (CaO) is not a stable product, and when exposed to the air it absorbs moisture and carbonic acid from the atmosphere to become air-slaked. With prolonged exposure, it finally reverts to its original chemical condition, i.e., calcium carbonate. The composition and price of the brands of burnt lime on the market (see list) vary from 70 to 84 per cent. of lime (CaO) and from £2 10s. to £3 10s. per ton respectively. The average price for 1 per cent. of lime (CaO) in the form of burnt lime calculated from the registered brands is 8.87d. per ton of agricultural burnt lime.

Slaked Lime.

Slaked lime is really burnt lime slaked with water whereby chemical reaction ensues, much heat is generated, and the chemical compound calcium hydrate ($Ca(OH)_2$) is formed. However, some of the slaked limes on the market are air-slaked by exposure of burnt lime, or probably burnt lime refuse, to the influence of the weather. In this way the burnt lime (CaO) combines with the moisture of the atmosphere or rain to form calcium hydrate, which is then more or less carbonated by absorbing carbonic acid from the atmosphere; consequently, brands of agricultural slaked lime contain varying amounts of calcium carbonate associated with the calcium hydrate.

Water-slaked lime ($Ca(OH)_2$), when prepared from chemically pure lime (CaO) would contain approximately 76 per cent. of lime (CaO), but a similar article prepared by water-slaking commercial burnt lime (CaO) would contain a much lower percentage, because the commercial article is not pure. The variation in the percentage of lime (CaO) in the brands of slaked lime registered ranges from 44.8 to 73.4 per cent., with an average lime content of 62.92 per cent. The average price is £2 7s. per ton, which, when computed on the average content of lime, gives the figure of 8.96d. as the cost of 1 per cent. of lime per ton of agricultural slaked lime purchased.

An extensive Limestone Deposit in the Western District.

A Lime Works in the Gippsland hills.

Ground Limestone.

Included in this section, with one exception, are the natural limes, i.e., ground limestone rock or calcite, chalk, and the limestone sand which forms the beach in certain parts of the Western District. The exception is the brand registered as Applim, which is chalk obtained as a by-product from gas works through the carbonation of lime by artificial means.

"Deep-Sea" agricultural lime is sea-sand, and the "Star" brand is prepared by grinding the mineral calcite, which is practically pure calcium carbonate.

"Shellime" is semi-dried chalk from a chalk pit at Sale, in the Gippsland district, and the remaining brands are ground limestone rock of varying quality.

Agricultural lime in the form of calcium carbonate is commonly termed mild lime and

its value depends upon the content of lime (CaO) and its mechanical condition, i.e., the fineness of the particles. The percentages of lime (CaO) in the brands of ground limestone or chalk registered varies from 30.8 to 55.9 per cent., with an average content of 45.6 per cent. of lime and an average price of £1 6s. 9d. per ton. The average cost of 1 per cent. per ton of lime in the form of calcium carbonate in the brands registered is 7d.

A Lime Works in the Western District.

The average cost or price of 1 per cent. lime per ton as calculated from the composition and price per ton of the brands registered is to be taken as firm only in the case of ground limestone or chalk. The unit values given for burnt lime and slaked lime, both of which are unstable products, should be accepted with reserve.

In conclusion, it should be noted that the lime in burnt lime and slaked lime on exposure will finally revert to its original natural condition, viz., calcium carbonate, and that agricultural lime is not an artificial fertilizer, nor can it be compared with, or regarded as a substitute for, superphosphate, basic phosphate, &c.

Dairy Farm Competition (*Continued from page 66.*)

Once more Mr. R. J. Flegg, of Tragowel, had the highest revenue from pigs. His returns from this source usually exceed £400; on this occasion the amount was £459. On eighteen farms more than £100 was received from sale of pigs; in seven cases the sum exceeded £150.

The returns of each of fifteen competitors from poultry was in excess of £20; the highest amount was £119, and was received by Messrs. F. Unthank and Son, of Hastings.

Forty entrants had spent more than £40 each on fertilizers during the year; £70 was the biggest individual expenditure.

Fifty-three purchased some form of concentrates; in 31 cases the expenditure on this account exceeded £20.

One competitor had paid £126 for water. Though very few expended any amount on agistment or hay, in one instance £50 was paid.

FARM COMPETITION ZONES.

The 113 Herd Testing units throughout the State are grouped into 10 zones as follow :—

Zone No. 1.—Walwa, Upper Murray, Tallangatta, Eskdale, Kiewa Valley.

Zone No. 2.—Myrtleford, Moyhu, Milawa, Swanpool, Alexandra, Euroa.

Zone No. 3.—Stanhope, North Murchison, North Shepparton, Tongala, Werribee, Undera.

Zone No. 4.—Cohuna, Leitchville, Kerang, Swan Hill, Pyramid Hill, Rochester, Calivil.

Zone No. 5.—Coleraine, Casterton, Wurt Wurt Koort, Condah Swamp, Portland, The Sisters, Mortlake, Port Fairy, Warrnambool, Paschendale, Woodford, South Glenelg, Macarthur.

Zone No. 6.—Pombornelt, Nalangil, Beeac, Ondit-Irrewarra, Apollo Bay, Winchelsea, Dreeite South, Ballarat, Newstead, Noorat, Camperdown, Keayang, Cobden, Bacchus Marsh, Ecklin South, Geelong, Gellibrand Valley, Kolora, South Purrumbete, Port Campbell.

Zone No. 7.—Orbost, Bairnsdale, Sale, Maffra, Traralgon, Yinnar.

Zone No. 8.—Warragul, Gainsborough, Jindivick-Neerim, Narracan, Boolarra, Mirboo North, Pakenham, Bunyip.

Zone No. 9.—Yarram, Toora and Welshpool, Stony Creek, Dumbalk North, Dumbalk, Tarwin Lower, Leongatha, Fish Creek, Foster.

Zone No. 10.—Wonthaggi, Loch, Mountain View, Kongwak, Poowong, Lang Lang, Korumburra Peninsula.

Kerang Crop and Fallow Competition 1935

Report of the Judge, A. B. Hackwell, B.Agr.Sc., Agricultural Instructor

WITH extensive areas devoted to mixed irrigation farming and a large tract of land employed for wheat growing, the Kerang district, bordering the banks of the Loddon, is an important agricultural centre. Its wheat lands extend in a V-shaped area to the west of the township and form the south-eastern corner of the vast wheat belt of the Mallee. Settlement commenced some 60 years ago and sound methods of wheat growing have gradually been evolved. The soils are of the heavy Mallee type, undulating in contour, and range from red sandy land to clay loams. Some areas, heavier than usual, are typical of the Mallee fringe and include box flats, crabholey in nature.

The past season at Kerang was noted for the particularly dry weather experienced in the normal cropping month of May, for the scanty rainfall in August resulting in fears of a complete crop failure, for the wonderful recovery after the good spring rains of September and October totalling five inches and, finally, for the favorable conditions during the ripening stages which enabled the wheat to fill well. No sign of rust was in evidence and an excellent sample of bright, plump grain would be harvested.

Considering the peculiar season the wheat crops did particularly well and those inspected in the competition were estimated to yield an average of eight bags to the acre, while in some of the exhibits the return would exceed this amount.

Most of the crops were sown in May and in some cases, owing to the dry spell which followed, a patchy germination was made. One exhibit had been seeded early in April while two entries had not been sown until after the rains, about mid-June.

The rainfall at Kerang for 1935 and the average monthly registrations for the past 54 years are set out in the accompanying table.

Varieties.

Ranee 4H and Ghurka were the most favoured varieties and are the two recommended for general sowing in this district. Some growers contemplated sowing leading wheats from other States such as Dundee, Bencubbin, and Baringa. They would be well advised, however, not to grow these varieties to any large extent until further evidence is available as to their yielding ability under Victorian conditions, and particularly as the wheats in present use, Ranee 4H, Ghurka, and Free Gallipoli, have shown such high prolificacy.

Kerang growers who have not yet tried Ghurka should include this wheat in their cropping programme. It should preferably be sown early on clean fallow, where, with its short straw, there would be little danger of it being overshadowed by weeds. Ghurka is an easy wheat to thresh, it stands well and is markedly resistant to flag smut disease. It is not a "showy" wheat and usually yields more than its appearance would indicate, as it forms very compact heads, well filled with grain.

It is suggested also that growers who are still using the old strain of Ranee should try out the improved selection, Ranee 4H. The

RAINFALL RECORDS—KERANG.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
													Points.
1935	92	86	61	174	63	92	180	53	240	256	40	116	1,453
Average 54 years ..	69	87	107	105	147	164	123	141	136	135	100	119	1,433

latter strain has given definitely higher returns in yield tests throughout the State.

From the inspection of the district it was evident that a relatively high standard of wheat farming has been maintained at Kerang despite the low prices and other difficulties experienced in recent years. Although many have increased their activities with sheep the use of good clean fallow, adequate manuring, and other well-proven practices appertaining to wheat growing are commonly adopted.

In practically all crops 60 lb. of seed and 90 lb. of superphosphate per acre were applied, these being the quantities recommended for general use under present conditions. The crops on the whole were very clean. Mustard was the most common weed, particularly in the patches where the germination was faulty.

Many growers regularly obtain new seed from the wheat-breeding stations, and the general standard of the purity of the crops was good. In some cases where the seed had been used for several years the introduction of fresh supplies was advised on account of the prevalence of foreign heads and barley and, in two crops, because a fairly high infection of loose smut was present.

Wheat Diseases.

Most of the crops inspected this season were practically free from disease, and no serious losses would be incurred. The problem of disease control, however, continually confronts the wheat grower and necessitates his constant attention if maximum yields are to be obtained. Frequently the disease is present in a crop to a greater extent than the farmer realizes, and the resultant loss is seldom fully appreciated. Although most growers are familiar with the main diseases, in some cases they confuse one with another and refer to them by the wrong names, with the probable result that incorrect control measures are employed. For example, flag smut is often confused with loose smut.

The following is a brief description of the four common wheat diseases, with methods for their control:—

Flag Smut (or Black Rust).

Flag smut or black rust appears as black, parallel lines on the stem or flag. The latter becomes curled and twisted and the infected stools seldom produce any heads. The black material is really a mass of spores or seeds of the disease. The diseased flag breaks up and the spores enter the soil where, if not destroyed, they will attack the next wheat crop. In other words, the soil is actually the storehouse of the disease, and it is necessary to farm the land with a view to eradicating the disease from the ground.

A good stubble burn destroys diseased plants and so reduces the number of spores that enter the soil. The working of the fallow encourages the germination of the spores in the soil and, having no wheat plants on which to live, they die. The growing of oats tends to starve out the disease, since oats are immune to flag smut. Pickling the wheat destroys any spores adhering to the grain and finally the sowing of wheats resistant to flag smut, such as Ghurka and Nabawa, is one of the best methods of eradicating the disease from infected paddocks.

Take-all (Dead-heads).

Take-all is similar to flag smut in that its spores are distributed through the soil. It is a form of foot-rot and may kill the wheat at any time from the seedling stage to maturity. When attacked in the seedling stage the plants usually die, leaving small, circular, bare patches. Often the disease does not appear until the plants have formed their heads. It attacks the roots and lower portion of the stem and the plant is then unable to absorb sufficient moisture for its full development. The ears ripen prematurely in the form known as "dead-heads," with the grain incompletely formed.

The disease is generally recognized by a blackening at the base of the wheat stalk. This blackened portion is comprised of spores of the disease, which drop to the ground and render the soil a source of infection.

The methods of control consist of—

(1) Burning the wheaten stubble:

(2) Early fallowing and thorough cultivation. These encourage the germination of the spores, and in the absence of a host plant on which they can live they will die. To be effective the fallow, therefore, must be kept free from barley grass, spear grass, and wallaby grass, on all of which the disease may live. Dry and also deep working of the fallow usually encourage the disease, and it is therefore essential for cultivation to be kept reasonably shallow, particularly during the final months in which the land is in fallow.

(3) The use of oats as a rotation crop. Oats are immune to take-all of wheat, and the growing of this cereal assists in starving the disease out of the soil. Barley, on the other hand, is susceptible to the disease, consequently its cultivation on wheat paddocks must be undertaken with caution.

Ball Smut, Bunt, or Stinking Smut.

Ball, or "stinking" smut, a disease in which smut balls take the place of normal grains in the wheat head, is well known to the wheat grower. It first attacks the crop in the seedling stage. The fungus enters the young wheat shoot, grows up inside the stalk, and eventually passes out into the head to form the smut balls. The black powder in these balls is actually the seeds, or spores, of the disease. Each ball contains myriads of spores, and when the balls are broken up during threshing, &c., the spores adhere to the outside of the wheat grain. The disease is controlled by destroying these spores by pickling the wheat with dry powder, formalin, &c. If properly carried out this treatment will entirely eliminate the disease, and the presence of any ball smut in a crop shows lack of care in the pickling.

With the dry method, 1½ oz. of powder per bushel should be used, and it is essential that the dusting be evenly done so that each grain receives its coating of powder.

Loose Smut, Blow Smut, or Flying Smut.

Loose smut makes its appearance in spring as soon as the wheat plant forms its ears. The young head develops into a loose mass of black spores. These blow about with the wind, leaving only the bare backbone of the head, usually blackened by a little smut that remains at the joints.

Infection takes place at the blossoming time, when the wind-borne spores enter healthy flowers. Grain is formed in the usual way, but the fungus is enclosed inside it. This infected grain cannot be distinguished from healthy seed but, when sown the following season, it produces smutty plants.

In consequence of the seed being infected internally (and not externally as with ball smut) this disease cannot be controlled by the ordinary pickling treatments, and the presence of loose smut in a crop is no reflection on the efficacy of the pickle that was used. The only practical control measure for the farmer is to use seed from a crop known to be comparatively free from this smut. When an appreciable amount of this disease appears in the crop a change of seed is desirable.

The Awards.

The aggregate competition for the fallow and crop was won by Mr. E. O. Manuel with a splendid crop of Ghurka, while the second award was secured by Mr. H. F. Robinson with a very creditable exhibit of Ranee. These two crops were the best inspected in the district. Both had germinated well. They were clean, even, and would yield heavily. The Ghurka was not quite so dense as the Ranee, but its heads had filled better and showed more spikelets with three, and even four, grains across. The purity of the Ghurka seed, however, was of moderate standard only, but, although it contained more foreign heads and barley than the Ranee, it was slightly freer from disease. The Ghurka had been sown in the first week of May with 65 lb. of

Aggregate Competition—100 Acres of Fallow 1934 and the Crop 1935.

Competitor.	Variety.	Yield.	Purity and Type.	Absence of—		Evenness.	Crop Total.	Fallow 1934.	Fallow and Crop.
				Weeds.	Disease.				
Maximum Points ..	——	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
E. O. Manuel, No. 1	Ghurka ..	32	17	14	15	14	92	96	188
H. F. Robinson ..	Ranee	31	18	14	14	14	91	94	185
J. M. Hallinan ..	Ranee 4H ..	28	19	14	15	13	89	95	184
R. G. Shipp ..	Ranee	30	17	14	14	13	88	96	184
T. A. Kendall ..	Ranee	27	18	14	13	14	86	94	180
E. O. Manuel, No. 2	Ranee 4H ..	25	19	13	14	13	84	92	176
Richard Shipp	Free Gallipoli .. / Ghurka ..	24	18	13	12	12	79	97	176
E. F. English ..	Ranee 4H ..	25	17	12	12	12	78	95	173

Sheep help to keep a fallow clean and consolidate the soil.

seed per acre, while the sowing of the Ranee had been delayed until after good rains, and it was finally cropped at the end of June with 60 lb. of seed per acre. In both exhibits the grain had been dry pickled; 90 lb. of superphosphate per acre was applied in each case, and neither of the crops was fed off. They were both sown on heavy red Mallee land, which had been fallowed with a plough in June and July, harrowed, then cultivated with a spring-tooth twice before harvest and once in the autumn. Mr. Robinson's fallow also received some additional harrowing.

Mr. Hallinan exhibited a very early-sown crop of Ranee 4H, which had been planted in the last week of April. It did not obtain so much benefit from the late spring rains as the winning entries, and it was not expected to yield so well. The grain, however, was an excellent sample, and the purity of high standard, but a point was lost on account of misses in the drilling.

Mr. R. G. Shipp's crop would yield above the average, and this entry came equal third with Mr. Hallinan's in the aggregate competition.

The detailed awards are set out in the accompanying table.

THE FALLOWS.

The value of early, thoroughly worked fallow is generally recognized in the Kerang district, and most of the farmers this year had taken advantage of the excellent spring rains to bring their ground into good order. In one or two cases this work had been neglected to some extent, and the delayed cultivation was not wholly effective in suppressing the weeds with the result that patches of barley grass and other plants had been allowed to go to seed.

The advantages of fallowing the land are three-fold—it stores up moisture and plant food for the benefit of the following crop; it affords a means of cleaning the land of weeds and disease; and, finally, it enables a solid, level seed-bed to be prepared.

One of the main features in regard to fallowing is the suppression of weed growth, and this all-important objective cannot be too strongly stressed. Not only do weeds on the fallow rob the land of the moisture and plant food being conserved for the subsequent crop, but certain species, such as barley grass, aid in the propagation of take-all and other forms of foot-rot disease. Sheep, of course, are an invaluable adjunct to cultivation, in trimming the weeds and consolidating the land. The secret of success in weed control, however, is to carry out the cultivation and sheeping while the weeds are in their early stages of growth. That the weeds can be successfully controlled is evidenced by the fallows prepared by the more efficient farmers in every district. Some growers, of course, handling greater numbers of sheep, do not look upon the average weeds on their fallows with great disfavour, and often they encourage their growth to some extent for extra feed. This practice tends to a diminution in the yield of the following wheat crop, and it is for the farmer himself to decide whether the return from this extra feed is of greater value to him than the wheat he is likely to lose. Experiments in this connexion indicate that it would be preferable to maintain a good standard of cultivation on the particular paddocks reserved for wheat growing and to obtain any extra feed required by

sowing down other land with oats for grazing rather than to endeavour to obtain it by neglecting the fallows.

The points awarded to the competition fallows are shown in the accompanying table.

100 Acres of Fallow—935.

Competitor.	Moisture.	Mulch.	Absence of Weeds.	Cultivation and Seed Bed.	Total.
Maximum Points ..	**25**	**25**	**25**	**25**	**100**
W. H. Robinson, jr.	24	25	24	24	97
J. M. Hallinan ..	24	24	24	24	96
Geo. Mahar ..	25	24	23	24	96
H. F. Robinson ..	24	24	24	24	96
Richard Shipp ..	24	24	23	24	95
R. G. Shipp, No. 1	24	23	22	24	93
R. G. Shipp, No. 2	24	24	22	23	93
T. A. Kendall ..	24	23	21	23	91
E. O. Manuel ..	23	23	22	22	90

The leading entry of Mr. W. H. Robinson, jun., was in splendid order. It was practically free from weeds and had been worked to an even depth and an excellent cloddy mulch and level seed-bed had been prepared. The land was a rich, heavy red sandy loam with a red clay sub-soil. It had previously been sown with oats for grazing, and had been ploughed in July-August, harrowed in September after rain, scarified and harrowed in mid-October, and spring-toothed and harrowed early in November.

Mr. Hallinan submitted a good paddock of grey-red sandy loam which also had been thoroughly prepared. Following oats it was summer-fallowed with a scarifier in February, mouldboard-ploughed in June, harrowed in July, scarified in August, spring-toothed in September and again in October.

Mr. Geo. Mahar's fallow, of chocolate loam, showed extra good moisture, a very even mulch and a splendid seed-bed. It had been summer-fallowed in February, scarified in June, spring-toothed in August, harrowed in September, and spring-toothed twice in October. A few young weeds were showing at the time of judging, and there was evidence that the wheaten stubble had not been completely burnt.

Mr. H. F. Robinson exhibited an even area of heavy red Mallee land, which also was in very creditable order. The mulch had been left in a fairly cloddy condition to minimize drift, and the final working was in the north-south direction. It had been worked the same as the winning entry except that the cultivation in October was done with a spring-tooth and not with a scarifier.

Books Reviewed

A Text Book on Forest Management, by M. R. K. Jerram, M.C. (Chapman and Hall, Ltd., London, 1935).—As explained in the preface by the author, this book is not intended to displace the work of previous writers on the same subject, but rather aims at a clear and concise exposition of the more important basic theoretical principles of forest management, in order to provide students of the subject with a substantial framework on which a fuller knowledge may be built up. In this aim the author has succeeded admirably, so that his book represents a very acceptable addition to the range of forestry text-books available for students.

The book comprises three sections, dealing respectively with the foundations of forest management, the preparation and control of working plans, and forest finance. A feature is the liberal use of very helpful diagrams to illustrate the derivation of formulae in connexion with yield regulation, whilst the section on forest finance explains the fundamental principles of this rather abstruse subject in a clear and simple manner.

The list price of the book in Great Britain is 10s. 6d.

[K. V. Ferguson, M.A., B.Sc.

Pasture Top-dressing.—Messrs. Horwood-Bagshaw Ltd., of 78 Currie-street, Adelaide, have issued a well-illustrated catalogue containing particulars of their special broadcasting machine for top-dressing pastures with superphosphate and other artificial fertilizers. Copies of this catalogue are obtainable free on application to the firm.

"Irrigation" White Clover

Samples Wanted

WHITE clover is a perennial legume of first importance in irrigated pastures, and in districts of good summer rainfall throughout Victoria. Where conditions are favorable, it is very productive and results in a marked increase in carrying capacity. It spreads by means of runners which take root as they grow, and may cover the ground with extraordinary rapidity, converting almost bare ground into green pasture within a few weeks. Like other pasture species, white clover consists of a mixture of strains or types, which show adaptation and suitability for different conditions and purposes. Those strains fall into two broad divisions, viz. :—

The "Irrigation" or Victorian Strain of white clover which forms a dense leafy sward.

(*a*) Crop types, like White Dutch clover, used as a temporary crop and for seed production; and

(*b*) Pasture types, like English wild white clover, New Zealand white clover, and irrigation white clover, which are leafy and persistent each in its own sphere, and are highly suitable for pasture purposes.

With the development of pastures in the irrigation districts of the State, small areas on farms at Wyuna, Tongala, Cohuna, and Dingee soon came under notice for the development of a luxuriant white clover. Following on their appreciation of the value of pastures under irrigation, many farmers paid particular attention to this strain. "Irrigation" white clover, as it is commonly termed, is a type which makes abundant growth when subjected to frequent watering, heavy top-dressing, and intensive grazing. Field trials at the Werribee Research Farm and at the Burnley Pasture Plant Research Field show that the plants belong to a new strain with distinct characters and habits of growth. The plants are large, leafy and vigorous; they commence quick growth early in the spring, and under proper watering and manurial treatment, sustain it until late the following autumn. They persist under close grazing and form a dense leafy sward, and if a field is allowed to run to hay, they make tall, rank growth, keeping pace with the grasses, and forming a considerable proportion of the resultant hay crop.

Commendable efforts are being made to harvest seed of white clover on a commercial scale, and it is desirable that farmers doing so should begin on a right basis by making sure of the strain of the clover which they propose to harvest. The trend of all seed trade is in the direction of seeds of definite and approved type or strain, and the seed grower is well advised to make this the basis of production.

[*Continued on page 87.*

Constructing a Trapnest

By W. O. Pederick, Assistant Poultry Expert.

TRAPNESTING is probably the best means of ascertaining the desirable as well as the undesirable characters in laying pullets. With a properly constructed trapnest and a little attention, one can obtain much information that will be of great help in selecting the most suitable hens from which to breed male birds to carry on future poultry farming operations.

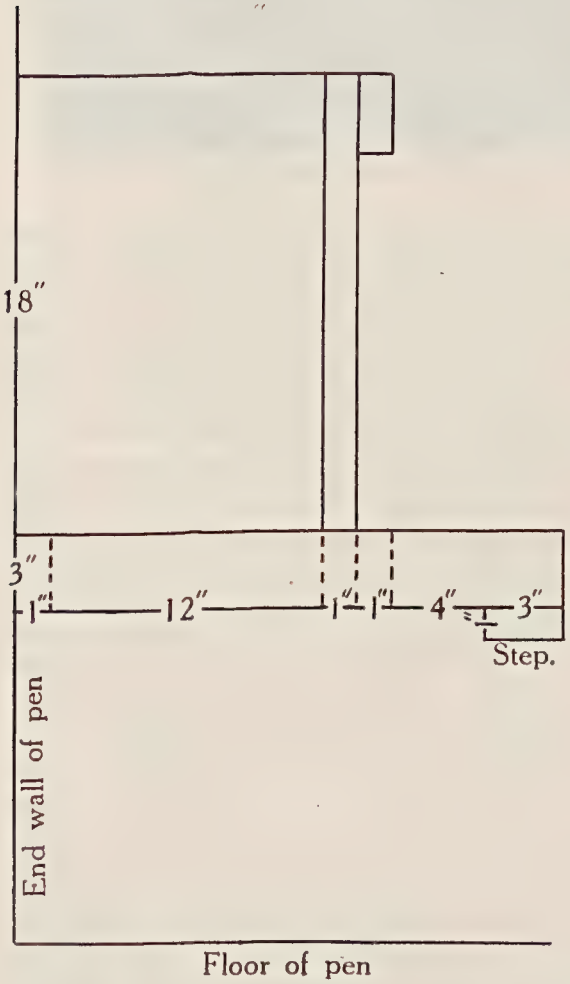


Fig. 1.—The end elevation of the newly-constructed trapnest.

Trapnesting not only enables the poultry-farmer to ascertain the number of eggs laid during a certain period, but it also allows him to observe the rate of lay or sequences, the size of the eggs laid by each individual bird, and the texture or quality of the shells, all of which are important in carrying on a commercial farm. As these characters are generally believed to be inherited, and are likely to be transmitted to the progeny, it is essential for the poultry farmer to gather and record as much of this information as possible.

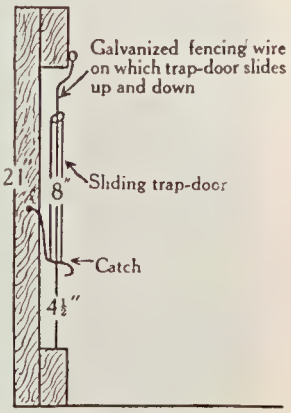


Fig. 2.—Showing the rolled edge of the trap-door resting on the catch.

In connexion with the Burnley Egg-laying competition, it was recognized by the Department that the aggregate score for six birds was insufficient information for the average competitor, as in saving cockerels for subsequent breeding purposes from a team of six birds, bred from as such, there always existed the danger that a son of a hen which possessed one or more undesirable characters might happen to be selected, instead of one from the best. With this in view, the system of trapnesting was introduced at the Ninth Competition conducted at Burnley during the years 1919 and 1920.

Under this system the score of each individual bird in the team is recorded. Undoubtedly, the single test pen is the most accurate method of testing layers, but with careful and regular attention, trapnesting will give very satisfactory results with less outlay of capital.

During the 1934-35 competition, 99.83 per cent. of the 70,328 eggs laid in the trapnest section were credited to the individual birds, leaving only .17 per cent. of eggs which could not be identified.

The easily constructed and efficient trapnests which have been introduced recently at Burnley.

The original trapnests, which had been in constant use at Burnley for sixteen years, were discarded last year, and replaced with new ones of a slightly different design. These new nests are very simple in construction, and work most effectively.

The following description, with drawings and photograph, should be sufficient to show the poultry keeper every detail of the construction, and enable him to install this system at a very moderate cost.

The nests are arranged to hang on the end wall of the pen, about 15 inches from the ground, the wall forming the back of the nests. Each nest should be approximately 1 foot square, but it is not necessary to make them

Fig. 3.—The front frame showing the dimensions.

(Continued on page 108).

Blood Splashing in Bacon Carcasses

By E. Murray Pullar, M.V.Sc., Veterinary Research Institute, Melbourne University.

"BLOOD Splashing" or, as it is more frequently termed, "Splashing," has been responsible for considerable economic loss to bacon manufacturers for many years. In this condition multiple hæmorrhages or blood spots are present in certain muscles of the body. These result from the tearing of muscle fibres and capillaries (tiny blood vessels), with consequent hæmorrhage (bleeding) into the tissues. They appear as irregular isolated blood-stained spots or streaks, ranging in size from that of a pin's head or less, to that of a sixpenny-piece. Their size and shape appear to vary with the muscle involved, but generally they are circular or elliptical. In the latter case they tend to follow the direction of the muscle fibres. In a freshly opened carcass the splashings are dull red in colour (the colour of venous blood). After the carcass has been hanging for some time the colour changes, by oxidation, to a brownish-red. It is generally stated that splashings are situated mainly in the muscles of the diaphragm (skirt), next in frequency in the abdominal wall, loins, ham and neck; but according to Anthony (*Vet. Record*, 1931) and others the heart and lungs are affected more frequently than the diaphragm.

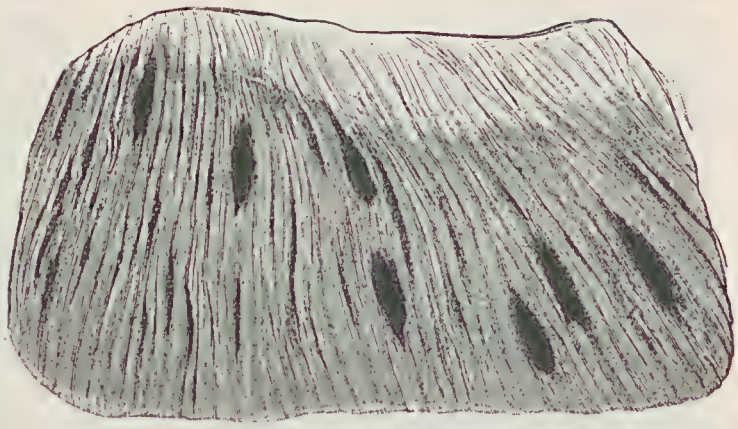
Splashings occur in the muscles of all animals but they are of greater importance in swine owing to their deleterious effect on the appearance and keeping quality of bacon and ham. In some European countries this condition is extremely common. Ellinger found that 3 to 5 per cent. of all slaughtered hogs were affected, while Ostertag found that up to 8 per cent. of swine carcasses show these hæmorrhages in the muscles of the diaphragm or elsewhere. No reliable statistics are available for Australia, but there is no reason for considering that the percentage of affected pigs is as high as that occurring in Europe. An additional reason for regarding this condition as important is, that there is no known method of removing the hæmorrhages once they have occurred, without ruining the adjacent flesh.

True splashing is entirely mechanical in origin; but similar hæmorrhages, in various parts of the body, may occur as a result of bacterial infection. Splashing has been carefully studied by a number of investigators in other countries, and while its nature is not fully understood, many factors contributing to its causation are known and may be easily avoided. These factors will be considered in turn.

Method of Slaughter.

Splashing is definitely associated with those methods of slaughter which involve the destruction of the brain. Shooting with a free-ball or captive-bolt pistol, or stunning with a

pole-axe produce the highest incidence of splashed carcasses. Stunning with a felling or blunt hammer is less liable to cause splashing, while the condition is almost unknown in animals "stuck" without prior stunning, and has never been seen following the use of the new "Electrolethaler" to produce electrical stunning. The Electrolethaler consists of a pair of strong metal tongs with insulated handles; the jaws are provided with spiked metal rosettes which are kept moist by means of rubber sponges soaked in salt solution. The jaws are applied to the animal's head so that they make contact on both sides just behind the ears, the direct flow of the current then passes through the base of the brain. The current can be controlled by means of a switch on one handle, and the time of application is from two to five seconds. Low voltage, high frequency current is used. This current is considered to be harmless to the operator. In one series of 15,000 English pigs, stunned by this apparatus, slaughtered and examined by Anthony (*Vet. Jour.*, 1933), no cases of splashing could be found.



Showing muscle ruptures and multiple hæmorrhages in the diaphragm of a hog. [After Ostertag.]

Edington and Elliot (*Vet. Record*, 1931) have shown definitely that better bleeding of the carcass is obtained by electrical stunning. Sticking without prior stunning was next best. (See accompanying table). Some years earlier Hill (*Lancet*, 1923) examined a number of animals slaughtered by various methods and found that those killed by throat cutting without prior stunning or shooting bled the best (this was prior to the introduction of electrical stunning).

Method of Slaughter.	Blood in millilitres per 100 grammes of wet muscle.
Killed by captive-bolt pistol with delayed bleeding	0.89
Killed by captive-bolt pistol with immediate bleeding ..	0.77
Stuck without stunning ..	0.62
Stunned by electricity and stuck	0.54

Tweed, Clark, and Edington (*Vet. Record*, 1931) and others have demonstrated that following destruction of the brain by shooting, the animal falls down, respirations cease almost immediately and the muscles of the body become tetanic (rigid). This rigidity persists for one-half to three minutes and is followed by involuntary, unconscious, spasmodic movements. These may be simple running or paddling movements but more often they are very violent. The action of the heart is slightly impaired (it does not cease beating for some time), and the *blood-pressure becomes greatly increased.* The same mechanism which causes this rise in blood-pressure forces the blood out of the organs of the abdomen into the muscles of the legs and body-wall. These two factors cause a still greater local rise in blood-pressure in the muscles with the result that weak blood vessels may rupture and hæmorrhage (bleeding) occurs. Probably the extra strain put on the distended vessels by excessive muscular contractions assists in causing these ruptures. All this happens within a few seconds after shooting.

With electrical stunning (as the brain is paralysed only, not destroyed) there is an initial rise in blood-pressure in the arteries, but this is not maintained even with continued application of the current. There is very little engorgement of the muscles; and the bleeding after sticking is extremely good. With the application of the current the animal becomes tetanic (rigid), and after the current is released, it relaxes and falls on to its side. Unless hoisted and stuck while unconscious the animal recovers completely in two to five minutes. There are no violent involuntary movements.

Delay in Bleeding.

At one time it was thought that delay between stunning and bleeding influenced the presence or absence of splashing. It has been shown time and time again that delay in bleeding influences *only* the size of the splashed

area, and has no influence on the presence of the condition.

The actual rupture of the blood vessels occurs within a few seconds of stunning, and bleeding into the tissues continues until sufficient blood drains away (from the severed vessels in the animal's neck) to lower the general blood pressure. If the animal is hoisted and stuck immediately the splashed area will be tiny and of little consequence. But if sticking is delayed for several minutes the hæmorrhage from the torn vessels will be considerable and a large splashing will result.

Fatigue.

Fatigue has a definite influence on the appearance of splashing. There is a high percentage of affected carcasses from pigs or other animals which have travelled long distances or which have been fatigued by being chased around the pen. This is explained by the fact that fatigued muscles become engorged with blood and when the animal is shot the engorgement is increased.

Struggling on the Hoist.

Struggling on the hoist appears to have little or no influence on the presence of splashing, as in one long series of cases examined by Tweed, Clark, and Edington (*Vet. Record*, 1931), cattle, sheep, and pigs were hoisted with or without prior stunning and allowed to hang head down suspended by one leg for periods as long as five minutes. In some cases the struggling was very violent but no splashing occurred. In Northern Australia, however, Ross Grant (Commonwealth Department of Commerce) has frequently seen in cattle extensive hæmorrhages in the leg by which the animal was suspended during the early stages of slaughtering.

Unknown Causes.

None of the investigators up to date have been able to produce splashing in every animal at will, although they can influence the percentage of splashed carcasses in a group of animals. For this reason it is considered that there is still another cause or causes operating. Many agree that even if the conditions which are known to predispose to splashing exist, the presence or absence of the lesions appears to depend on some inherent strength or weakness in the walls of the capillaries themselves. Ostertag considers that the presence of excessive amount of fat (which is fragile) in the muscles may exert a weakening effect. But it is our opinion that the cause of this weakness lies in the system under which the pigs are reared. Where pigs are raised under natural conditions, i.e., kept in paddocks or large pens with every opportunity for exercise, the muscles and associated blood vessels will develop to their best. On the other hand, where pigs are kept in sties and overfed on unbalanced rations, with little exercise, the muscles and blood vessels will be fragile. Splashing is seldom if ever seen in sows and boars which have been used for breeding, probably due to the fact that they usually live a more active and natural existence.

Conclusions and Recommendations.

As all the causes of splashing are not known, it is not possible to avoid the condition entirely, but the following steps can be taken to minimize its incidence:—

(1) Avoid methods of slaughter involving destruction of the brain. The use of the Electrolethaler will correct this.

(2) Avoid unnecessary delay in bleeding, which although it will not have any effect on the number of lesions, will increase their size.

(3) Do not slaughter animals for at least 24 hours after travelling.

(4) Do not fatigue the animals by making them run unnecessarily in the lairs, drafting, or killing pens.

Index to *Journal of Agriculture* for 1935

The Index of the Journal for 1935 has now been printed, and copies may be had on application to the Department of Agriculture.

Hopetoun Crop and Fallow Competition 1935

Report of the Judge—H. L. Hore, B.Agr.Sc., Officer-in-Charge Mallee Research Station, Walpeup.

THE crop and fallow competition conducted by the Hopetoun Agricultural Society this year attracted 25 entries—12 crops and 13 fallows.

The season at Hopetoun was not by any means an ideal one, the total rainfall for 1935 being 1,030 points, which is 310 points below the average for the preceding 34 years. The rainfall to the end of May amounted to only 198 points, which fell mostly in small showers. This did not give much opportunity for the farmer to prepare his land into the desired condition for seeding at the normal time, and the majority of crops were not sown until late in June. The rainfall in August was well below the average, but, with fair falls in September and October and with moderate temperatures, the crops in most cases finished fairly well. The estimated average yield of the crops in the competition was 15 bushels per acre.

An inspection of the exhibits showed the chief diseases present this year to be ball-smut and flag-smut. Both are preventable diseases, and strict attention to details of good farming practices should reduce their presence to negligible proportions.

Previous reports on this competition have adequately dealt with the pickling of wheat against ball-smut. As both the wet and dry pickles will give excellent control if properly carried out, the persistence with which this disease is recorded is definite evidence that some farmers at least are not giving this important operation of pickling the grain the attention it deserves

The following control measures are advocated on areas where flag-smut has made its appearance:—Good fallowing, the burning of wheaten stubbles, the inclusion of oats in the rotation, pickling of the seed, and the use of wheat varieties resistant to the disease—for example, Ghurka and Nabawa.

Six different wheat varieties were exhibited in the competition, the most popular being Ranee 4H, Ghurka, and Free Gallipoli. Experiments in the district, conducted by the Department of Agriculture at Rainbow, have proved Ghurka and Ranee 4H to be the highest yielding wheats over a period of years, and these two varieties are recommended for sowing on the bulk of the areas cropped by the farmers in the Hopetoun district.

The average amounts of seed and superphosphate used on the competition crops were 68 lb. and 67 lb. per acre respectively. The former varied from 55 lb. to 90 lb., and the latter from 45 to 90 lb. per acre. The recommended quantities for general sowing are—seed 60 lb. and superphosphate 90 lb. per acre. The quantity of seed stated (60 lb.) should be ample, and it is considered that it would be more profitable at present prices to increase the superphosphate rather than the amount of seed.

One competitor had grazed his wheat crop with sheep. Preliminary experiments at the Mallee Research Station, at Walpeup, indicate that this practice, under Mallee conditions, is likely to cause a considerable diminution in yield. It is a matter for the farmer to decide whether the sheep feed obtained is likely to be of more value to him than the wheat which he stands to lose. It is thought, however, that an area of oats sown for the purposes of grazing would be the better proposition.

The Awards.

Mr. G. A. Barnes's winning crop was on rising sandy ground, well suited to the season, and was expected to yield the heaviest of all crops inspected in the district. It was practically free from weeds and disease, but lost a number of points on account of its impurity of seed. Ploughed with a sundercut at the end of July, the fallow was harrowed in September, scarified in October, and spring-toothed in Oc-

OPEN COMPETITION, 75 ACRES—AGGREGATE FALLOW 1934 AND CROP 1935.

Competitor.	Variety.	Yield.	Purity and Type.	Absence of—		Even-ness.	Crop Total.	Fallow 1934.	Grand Total.
				Weeds.	Disease.				
Maximum Points ..		**35.**	**20.**	**15.**	**15.**	**15.**	**100.**	**100.**	**200.**
G. A. Barnes ..	Ranee	35	16	14	14	13	92	92	184
A. E. Hofmaier No. 2	Free Gallipoli ..	27	17	14	13	13	84	93	177
H. E. Poulton No. 1	Ranee 4H, Free Gallipoli, Bencubbin	30	18	13	13	13	87	88	175
A. E. Hofmaier No. 1	Free Gallipoli ..	25	17	13	13	13	81	92	173
J. E. Huf ..	Ranee 4H ..	27	19	14	14	14	88	85	173
H. E. Poulton No. 2	Ghurka ..	27	18	13	15	12	85	87	172
J. E. Carra ..	Nabawa ..	23	18	15	15	11	82	88	170
C. R. McFarlane	Ranee 4H, Free Gallipoli	25	18	14	11	14	82	88	170
H. W. Gould ..	Ghurka ..	25	18	12	15	12	82	87	169

tober and November. It was then combined over in early June, and sown during the last week of that month with 65 lb. of dry pickled seed and 90 lb. of superphosphate per acre.

Mr. A. E. Hofmaier gained the second award in the aggregate. His crop, Free Gallipoli, No. 2 entry, was grown on the winning fallow of 1934. The land had been ploughed with a undercut in July, harrowed early in August, and combined three times before harvest. It was subsequently worked twice with the combine, and sown in mid-June with 60 lb. of seed and 75 lb. of superphosphate per acre.

Mr. H. E. Poulton's No. 1 exhibit was expected to yield well, and the entry came third in the aggregate, while Mr. J. E. Huf's crop (Ranee 4H) scored well for purity, cleanliness, and general appearance.

Mr. G. A. Barnes was also successful in the Returned Soldiers' Section, with 50 acres of the crop entered in the Open Competition.

The second award was gained by Mr. E. J. B. Schofield, whose crop showed good purity, and was very clean. Its yield, however, would be somewhat reduced by considerable tipping-off in the Free Gallipoli portion.

The fallow, which contained a fair amount of grey ground, had been well prepared, and after summer it was worked with a spring-tooth in May. The crop was sown at the end of June with 60 lb. of seed and 60 lb. superphosphate per acre, the seed being formalin-pickled at the rate of 1 lb. of formalin per 60 gallons of water. This is slightly weaker than the strength usually advocated, namely, 1 lb. to 45 gallons of water.

The Fallows.

Most of the fallows submitted for judging were in good order, and some of the competitors were taking advantage of the rain just prior to judging to work the land over again. It provided a good opportunity to leave the

SOLDIERS' SECTION, 50 ACRES—AGGREGATE FALLOW 1934 AND CROP 1935.

Competitor.	Variety.	Yield.	Purity and Type.	Absence of—		Even-ness.	Crop Total.	Fallow 1934.	Grand Total.
				Weeds.	Disease.				
Maximum Points ..		**35.**	**20.**	**15.**	**15.**	**15.**	**100.**	**100.**	**200.**
G. A. Barnes ..	Ranee	35	16	14	14	13	92	92	184
E. J. B. Schofield	Ranee 4H, Free Gallipoli	30	19	15	13	13	90	92	182
H. W. Gould ..	Ghurka ..	27	18	13	15	12	85	87	172

AWARDS—OPEN FALLOW (75 ACRES).

Competitor.	Moisture.	Mulch.	Absence of Weeds.	Cultivation and Seed Bed.	Total.
Maximum Points	**25.**	**25.**	**25.**	**25.**	**100.**
J. J. Sheehy, No. 1 ..	24	24	24	24	96
A. E. Hofmaier	25	23	23	24	95
H. E. Poulton, No. 1 ..	25	23	22	24	94
H. E. Poulton, No. 2 ..	24	24	21	24	93
J. E. Carra	25	22	22	23	92
H. W. Gould	24	23	22	23	92
G. A. Barnes	22	23	20	23	88

fallow well ridged after the flattening produced by the winds. Most of the farmers in the older Mallee districts utilize sheep on their fallows to assist in the control of weeds and to consolidate the seed-bed. By combining adequate sheeping at the right time and cultivation, a good economical fallow may be obtained. It is essential, however, that both the cultivation and sheeping be carried out while the weeds are in their early stages of growth. Although a fallow at the time of judging may appear to be free from weeds, there may be evidence that the weeds had been allowed to seed, and in cases where this was observed points were deducted accordingly.

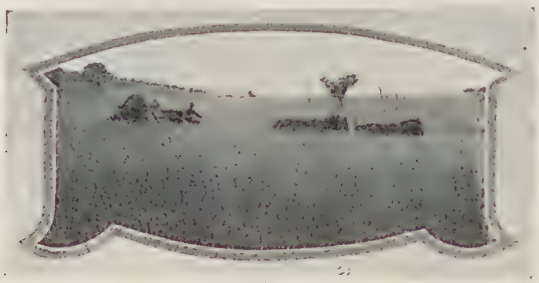
The winning entry was submitted by Mr. J. J. Sheehy. The paddock consisted of flat Mallee country, fairly heavy in character. It had been disk-ploughed to a depth of 2½ to 3 inches from oaten stubble during April, and spring-toothed during each of the months of July, September, October, and November, each working being across the other. Sheep had been used up to July. The resultant fallow was a very attractive entry, with a good mulch, practically free of weeds.

Mr. A. E. Hofmaier's fallow was placed second. It had been ploughed with a sundercut in April to a depth of 3 inches, then left lie till July, when it was skim-ploughed 2½ inches deep. It was combined twice during August and again in October and early in December. Cross workings were adopted, and sheep were used occasionally.

In the Soldiers' Section, Mr. J. J. Sheehy gained both first and second places. The first award was taken with the No. 1 entry described above. The No. 2 entry was on much lighter land, more suited to production of crops in years of light rainfall. The land, which had been out for grass, was disk-ploughed late in July, harrowed immediately, and spring-toothed in October, November, and December. The moisture content was good, and the recent cultivation had left the mulch in a nicely ridged condition.

SOLDIERS' SECTION (50 ACRES).

Competitor.	Moisture.	Mulch.	Absence of Weeds.	Cultivation and Seed Bed.	Total.
Maximum Points	**25.**	**25.**	**25.**	**25.**	**100.**
J. J. Sheehy, No. 1 ..	24	24	24	24	96
J. J. Sheehy, No. 2 ..	25	24	21	23	93
H. W. Gould	24	23	22	23	92
E. J. B. Schofield	23	23	22	24	92
K. Dodgshun	24	22	21	23	90
G. A. Barnes	22	23	21	23	89



Rabbit Destruction

Poisoning, Digging out, and Fumigating

By J. Matthams, Superintendent Vermin and Noxious Weeds Branch, Lands Department

BY a proclamation made under the *Vermin and Noxious Weeds Act* 1928, all owners and occupiers of land are required on and after the 12th February, 1936, to commence and continue the destruction of all proclaimed vermin, including rabbits, on their properties and on the half-width of all adjoining roads. All landholders who fail to take sufficient reasonable means to fully and continuously comply with the proclamation are liable to a penalty of not less than £2 and not more than £50.

The Lands Department wishes to avoid prosecutions, if possible, but, at the same time, landholders who comply with the Act must be protected and it will be necessary to institute proceedings in all cases of neglect. The proclamation and notices served under the Act do not specify the method by which rabbits should be destroyed, it being left to the discretion of the landholders. Surface poisoning, however, is strongly recommended during the summer months followed by burrow destruction, and the necessity for carrying out this work cannot be too strongly urged.

Rabbits prefer the succulent nutritious grasses, and during the hot summer months when the grasses toughen or, as is the case in sections of the Mallee, partly or entirely disappear, the rabbits will readily partake of any prepared poisoned food, especially if unpoisoned apples or carrot bait is first laid as "free feed" for two or three nights.

A few years ago rabbits were very numerous, particularly in parts of the Mallee. Though the infestation has been greatly reduced it is found in moving about the State that the past breeding season has been a prolific one. This season extends from about May to December though at other times a number of young rabbits may be seen. The young does will, during the next breeding season, be reproducing if they are not destroyed and with their progeny and that of the older rabbits, the increase will be twenty-fold or more.

Much has been written regarding the losses sustained by graziers and others through the depredations of rabbits, but reference to this phase of the rabbit problem will not be inappropriate. It is estimated that eight rabbits consume as much grass as one sheep, but not only is the consumption of crop and pasture a serious loss, but also the rabbits bite deeply into the heart of the grass and retard its growth. On heavily infested country the nutritious grasses gradually disappear and are supplanted by a useless moss as the result of pollution. After a time the land becomes "rabbit sick" and is incapable of supporting the rabbits that have brought it to this useless condition, and it will remain so for a year or two after the rabbits have deserted it.

The aggregate results of the summer campaign depend upon the efficacy of individual effort. The necessity of carrying out successful poisonings cannot be too strongly urged, for, during this time, the rabbits eagerly partake of almost any poisoned material that is prepared in accordance with the recommended formulae. If this is done, and is followed by digging out or fumigating, the pests can be reduced to a minimum and the productive areas of the State will be protected.

Poisoning.

On a private property in the Seymour district a poisoning was carried out by the local inspector during the middle of January this year. Altogether 943 rabbits were destroyed with apples and strychnine. The rabbits were free fed with unpoisoned bait cut into small cubes nearly half an inch square for two nights and on the third night the poisoned bait was laid. The unpoisoned and poisoned bait was sweetened with sugar. The sugar has a double purpose. Rabbits are very fond of sweetened bait, and when so treated the powdered strychnine sprinkled on the bait through a pepper canister or a small tin with a perforated

On this 200-acre timber property in the Wimmera there were no burrows yet 1100 rabbits were poisoned.

lid readily adheres to the bait. When preparing the poisoned bait, mix the sugar in the proportion of about 1 lb. of sugar to 12 lb. of bait and lay it out on a bag to drain. Then place two or three rounds of the bait in the mixing vessel, sprinkle a portion of the strychnine on the bait and mix thoroughly. Then add more bait and sprinkle with more strychnine until the required quantity is prepared. One ounce of strychnine should be used with every 12 to 16 lb. of bait.

If the strychnine is in crystal form it will be necessary to powder it by rolling it with a bottle on strong brown paper before depositing it in the pepper canister or tin. An approximate estimate of the bait required can be made by calculating that 1 lb. of bait cuts into about 240 cubes of suitable size. When free feeding, the bait is laid a few inches apart where the rabbits are thickest, reducing the amount of bait where the infestation is light. The light furrows in which the bait is laid should be drawn in such a position that the rabbits will pass over them when moving from burrow or other harbor to the feeding grounds, but not close to the burrows. If the whole of the free feed is taken, increase the amount the second night. The free feed attracts the rabbits for a considerable distance and it may be considered advisable to give them a third free feed, and increase the amount by laying the baits closer together. The poisoned baits are laid from 6 to 12 inches apart where the rabbits are thickest and further apart where the free feed has not been well taken. To obtain satisfactory results it is essential to give them plenty of free feed and ample poisoned bait.

When preparing apple bait, some poisoners recommend the following procedure:—Instead of laying the sweetened unpoisoned bait on a bag allow it to drain in a large dish and save the syrup that drains from the bait. When the poisoned bait is being prepared, the powdered strychnine is applied and allowed to soak into the baits for an hour or more. Then mix the syrup with the poisoned bait. This forms a coating over the bait and helps to conceal the presence of the strychnine, which is bitter.

Carrot bait is prepared in the same way as apple bait, but the sugar must be applied before the strychnine, otherwise the poison will not readily adhere, the surface being less moist than that of apple bait.

There are phosphorus preparations on the market which are convenient to use. No free feeds are given and the prepared mixture, consisting of pollard, molasses, and phosphorus, is laid out in accordance with the directions given on the tins. This prepared material is sufficiently attractive where there is an absence of green grass, but is not so attractive to rabbits in those parts of the State where there is plenty feed.

Digging out.

The basis of effective work during the autumn and winter months is harbor destruction. Although summer poisoning destroys many rabbits some are sure to survive. These should be destroyed later either by digging out or fumigating. The ground then being moist the burrows are more easily dug out, and this procedure is strongly recommended if the burrows are not too deep and the ground is not too hard. The results are permanent and effective if all the runs are dealt with. Before digging out the paddock should be scoured with a dog or two, or, if the property is shot over, the rabbits will scamper to burrow harbor. When digging out a stick should be used to trace the direction in which the passages are running and care taken to see that they are dug out to the end.

After digging out is completed the burrows should be closely watched and if it is found that any runs have been missed or re-opened they should be dealt with at once or the rabbits which inhabit them will soon extend the burrow and breed up again. In heavy rainfall country where scouring and erosion may occur it is advisable to replace the earth after all the passages have been thoroughly dug out.

Fumigation.

While digging-out is the most effective method of destroying burrows, very satisfactory results can be obtained by fumigation. The burrows must, however, be carefully watched; and, if re-opened, fumigated again as often as is necessary until they become uninhabited.

When commencing operations, select one of the main openings showing evidence of much traffic. Widen and dig out the opening about 18 inches deep. If a machine is used to force in the fumes, insert the hose well into the opening and tightly pack earth around the hose to prevent the fumes returning. As the fumes emerge from each of the other openings close them up tightly and continue forcing in the fumes. If it is found that the fumes have not issued from some of the openings it is evident that these are not connected with the openings in which the hose has been inserted and must be treated as part of a distinct burrow.

If the ground is hard or the burrows are situated in rocky country, or in the banks of creeks, or about tree trunks, digging-out may be uneconomical or impracticable, and in such circumstances fumigation is recommended.

"Irrigation" White Clover (Continued from page 76.)

The White Dutch or European strain of white clover.

With the object of locating as many fields as possible of this "irrigation" white clover, the Department invites irrigation farmers, who have well-established fields of white clover which have come naturally or voluntarily into being, to communicate with the Director, The Department of Agriculture, Melbourne, C.2, and give particulars of any such fields which they may have. They are invited also to submit a small sample of seed, say, half an ounce, to be sown for examination in field plots in the Burnley Pasture Plant Research Field. The field plots will be open for inspection at any time, and the results of an expert examination will be available when completed.

It is requested that farmers interested should write to the Director of Agriculture as soon as possible.

Butter Production and Export

The following tables show:—

(*a*) Factory production of butter and cheese in Victoria for the period, July to September, and for the months of October and November, 1935, compared with the corresponding periods of 1934, and

(*b*) Quantities and percentages of various grades of bulk butter examined in Victoria from 1st July to 28th December, 1935, in comparison with the corresponding period of 1934.

FACTORY PRODUCTION OF BUTTER AND CHEESE IN VICTORIA (QUANTITIES IN TONS).

Month.	Butter.		Cheese.	
	1935.	1934.	1935.	1934.
July to September (inclusive)	13,553	11,652	1,155	827
October	9,308*	7,394	684*	567
November	10,137†	8,996	676†	588
Totals 5 months	32,998	28,042	2,515	1,982

* Revised figures. † Subject to revision.

BULK BUTTER EXAMINED FOR EXPORT IN VICTORIA (QUANTITIES IN TONS.).

Period.	1935. How Graded—				Total.	Period.	1934. How Graded—				Total.
	Ch.	1st.	2nd.	Pty.			Ch.	1st.	2nd.	Pty.	
1st July to 30th November ..	13,509	5,958	1,221	116	20,804	1st July to 1st December ..	8,522	7,728	1,102	154	17,506
1st to 28th December	3,613	1,917	486	84	6,100	2nd to 29th December	2,301	3,077	584	48	6,010
Totals 1st July to 28th December	17,122	7,875	1,707	200	26,904	Totals 1st July to 29th December	10,823	10,805	1,686	202	23,516
Percentages ..	63·6	29·3	6·3	·8	..	Percentages ..	46·0	45·9	7·2	·9	..

Phylloxera-Resistant Vine Stocks (IV.)

Including Some Recent Introductions

By F. de Castella, Viticulturist

Parts I., II., and III. of this series appeared in the June, October, and November, 1935, issues of this Journal.

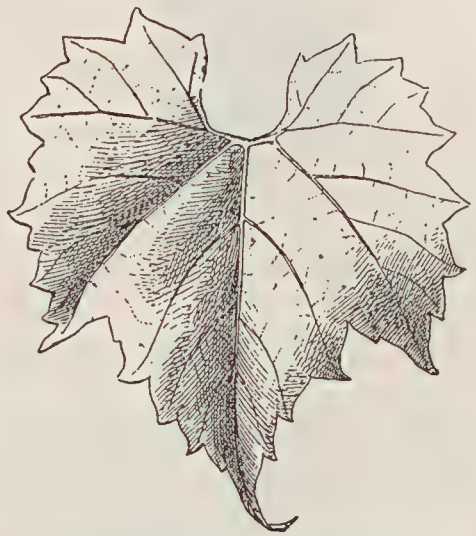
CONSIDERATION must now be given to some hybrid stocks, in the breeding of which several other North American vine species play a part. These comprise V. Monticola, V. Aestivalis, V. Arizonica, V. Cinerea, and V. Candicans; but before dealing with them in detail, the leading features of these species may be outlined briefly.

Vitis Monticola.

(The Sugar, or Sweet Mountain Grape (Munson).)

In V. Monticola we have another remarkable North American Vitis, though one that differs widely from the foregoing species by its less vigorous growth. Its development is much smaller than that of V. Cordifolia or even V. Berlandieri. It is indeed classed as a weak plant by several authorities. It nevertheless presents valuable attributes in other directions, which are retained by hybridization to a large degree, while vegetative vigour can be built up to a sufficiently high standard.

V. Monticola is a hot climate native, and as such of greater interest under Australian than under French conditions. Its most precious qualities are "rusticity," drought resistance, and lime tolerance. With regard to lime tolerance, it is the equal of V. Berlandieri, if indeed it does not surpass it. Such at least was the opinion of that veteran vine breeder Couderc, who changed the name of the species to *Vitis Calcicola* in his catalogue. He also considers that it has played a part, if a somewhat remote one, in the breeding of Rupestris du Lot, which is, in consequence, often given the synonym of Rupestris Monticola. Ravaz, however, expresses doubt as to the correctness of this view. V. Monticola was determined as a species by Buckley in 1861. Subsequently there was confusion between it and V. Rupestris, and also with V. Aestivalis; with the former of these it has some points of resemblance. Viala definitely endorsed Buckley's views as to its distinct specific nature in 1887.



***Vitis Monticola*—a parent of some hybrids showing promise under Australian conditions**
[After Mazade.

Viala (Mission Viticole) describes its rather limited natural habitat in Central Texas, west of the Brazos River:—

> It does not occur on plains or river banks, but on the flanks of hills some 1,500 feet in height; above the 500-ft. level, and on the plateaux crowning these slopes. This region is characterized by extreme drought. Winter cold is sometimes intense—36 deg. F. below freezing—and in summer the thermometer rises to 108 deg. F. . . . Though a creeping vine, it does not climb high trees It entwines bushes and shrubs, its glossy green leaves contrasting strongly with the dried up appearance of this stunted vegetation. Sometimes it grows amidst branched cacti, in the driest situations, fully retaining the handsome lustre of its foliage.
>
> V. Monticola is always a small vine, it has the smallest growth of trunk and cane, but is the one which, with Berlandieri, perhaps, remains greenest in the driest localities, and hottest aspects. It is a rare species, of relatively limited distribution, in

Another form of V. Monticola. Note the curled margins of the leaf.

[After Mazade.

clearings in the woods, and much less plentiful than such Texan species as V. Candicans and V. Berlandieri.

According to Munson, it is a remarkable and distinct species, well worthy of cultivation as an ornamental vine. Its leaves, pale reddish when young, become bright lively green, very smooth, and shining, as though varnished, especially below. The texture is dense, but brittle. Foliation, flowering, and ripening of fruit, late to very late; about with V. Cordifolia, except that it holds its foliage later. It is a valuable stock for grafting in dry climates, and very limy soils. Its slenderness in the wild woods was at first thought derogatory, but in cultivation it becomes quite stocky. It is often found hybridized with V. Candicans, V. Berlandieri, V. Rupestris, and V. Arizonica—such hybrids, in the grounds of the writer, grow very vigorously, having large strong vines, and doubtless would be excellent stocks upon which to graft. Some of them bear a fairly good fruit for wine making.

Ravaz comments on this fair quality of its fruit. Though the berries are small, and contain but little juice, Coudere utilized it in the raising of direct producers, yielding good products. Ravaz also refers to its hot and dry native habitat, and its resistance to heat, drought, and winter cold, provided its wood was able to ripen properly during the growth cycle. He endorses Coudere's views as to high lime tolerance, and considers that it would be an excellent stock for "chlorosis" soils but for two defects—firstly, its small above-ground development that makes it unpopular with nurserymen. This, however, only concerns the aerial portion; that below ground is powerful, and carries vigorous scions. Secondly, it is refractory to grafting, whether in the field or on the bench and the cutting-strike, which is only slightly better than that of V. Berlandieri, is insufficient in practice."

The difficult grafting he complains of would seem to be due to the cold French climate; there has been no trouble of this kind with Monticola hybrids under the warmer conditions that prevail in Australia. Otherwise, affinity is satisfactory, and once knitted the grafts develop normally. No evidence is forthcoming concerning its influence on fruitfulness or wine quality; the late retention of foliage should favour the latter, and both are highly satisfactory in the case of some Monticola hybrids.

In appearance, V. Monticola shows striking individuality. Its thick, shiny foliage, with strong cuticle and sunken stomata is characteristic of a plant suited to hot, dry climates. The spiky dentition almost recalls a holly leaf, a facies very apparent in most of its hybrids (see photographs of No. 13205 and Monticola hybrid). The canes, of mahogany colour when ripened, are ribbed or striped lengthwise, and angular in section. The fleshy, deeply plunging roots are well developed, though not of the highest phylloxera resistance. It is awarded 17 points on the V. and R. scale, which would place it on a par with V. Berlandieri, or ample for all but very "phylloxerating" soils. In later writings, Ravaz expresses doubts concerning the adequacy of its resistance, which would suggest its scarcely meriting the co-efficient 17. These rather lengthy quotations concerning this vine seem justified in view of the promise shown by some of its hybrids—especially Nos. 554-5 and 18804 under Australian conditions.

V. Aestivalis.

(The Summer Grape.)

This species merits brief reference, since one of the best Monticola hybrids is partly of Aestivalis descent. It is also fitting that certain other Aestivalis hybrids, such as Jacquez or Lenoir, that played a very important part in the early years of reconstitution, should be mentioned here. In its pure form, it is not used in vineyard practice. Though widely distributed in the East Central States of the United States of America, and thus a warm climate vine, its poor cutting-strike, only moderate phylloxera resistance (16 by V. and R.

scale), susceptibility to lime chlorosis and rather difficult grafting, have been against its use. It nevertheless presents some good points on soils that suit it, especially those of sandy nature. It has large truncate leaves, tomentose and often rusty beneath, with a close grained crinkle between the veins above, giving it a typical dull aspect.

V. Aestivalis is a species of mainly historic interest, for it attracted far more attention 50 years ago than it does to-day. It has played an important part in the breeding of several then popular "direct producing" hybrids; its fruit, like that of the allied V. Lincecumii, being superior to that of most American wild vines. Among these Jacquez or Lenoir, Herbemont, Cynthiana, or Norton's Virginia, Cunnigham, Black July, Pauline, &c., were the main hope of the renascent French vine industries in the eighties. Some of these, first regarded as pure Aestivalis, were shown by Millardet to be of hybrid origin. The remote introduction of some of these vines into viticultural practice, that dates back considerably over a century, and the scanty records available, endow their early history with a somewhat legendary glamour, making it difficult to disentangle the true facts. Munson has evolved the rather hypothetical *V. Bourquiniana,* that may be identical with the Southern Aestavalis group of Engelmann, to explain their breeding, but this is not admitted by French authorities, who look upon them as ternary hybrids of V. Aestivalis, V. Cinerea, and V. Vinifera. The more important members of this group will be referred to presently.

Though first grown for their fruit, they were soon made to serve as grafting stocks. Jacquez, in particular, has, as such, played a very important part in early French reconstitution, until it was replaced by the far superior stocks available to-day. Until quite recently, it was a popular stock in California and at the Cape.

V. Arizonica.

(*Hairy leaved Gulch Grape* (Munson).)

As its name indicates, V. Arizonica is a native of Arizona and adjoining regions, and thus a hot climate vine, that ripens its wood imperfectly in France. It occurs, wild, on soils varying from river banks to arid hill sides, and is credited with high drought resistance (Perold). It is a rather weak vine, but tolerates lime to some extent, thriving where Riparia and Rupestris fail; it strikes fairly easily from cuttings, but its resistance to phylloxera is scarcely sufficient in very dry situations (Ravaz).

Foex includes it in the *Rupestres* group, which would make it botanically related with V. Monticola and V. Rupestris; with the latter it has some points of resemblance, in its bushy growth habit and liking for pebbly soils. Though not grown in France, it was tried as a stock in California some years ago, its behaviour being similar to Rupestris, though it was said to sucker less and graft more easily; it was, nevertheless, soon superseded by V. Rupestris. Though this species is only of secondary importance, it is concerned in the breeding of such hybrids as No. 262 (Rup. x. Ariz.), No. 81-22 (Rup. x Ariz.), and perhaps 18804 (Rup. x. Mont.). The first two are good stocks, though devoid of outstanding qualities No. 18804 will be further referred to presently.

V. Cinerea.

(*The "Ashy" or "Sweet Winter" Grape.*)

V. Cinerea differs from V. Arizonica in being a vigorous, stout stemmed vine that climbs high trees, when growing on rich soils in its natural habitat, which is practically the

Vitis Cinerea—the "Ashy" or "Sweet Winter" grape. [After Mazade.

same as that of V. Cordifolia, though rather less extensive. It is more plentiful on "bottom lands" than on the hillsides favoured by V. Cordifolia. It is remarkably tolerant of "wet feet," growing wild on stiff clay soils, and even on low marshy land, flooded in winter, but hard and dry in summer, for it also possesses a good measure of drought resistance, though not equal in this respect to V. Berlandieri, V. Monticola, and V. Cordifolia. Its very powerful root system is well adapted for hard, dry soils, and its resistance to phylloxera is good (15 V. and R. scale), and its grafts are vigorous and fruitful. On the other hand, its cuttings strike very badly, and it does not tolerate a high proportion of lime in the soil, hence the small attention paid to it in France, where it would seem to have been unduly overlooked. It certainly has potentialities for the breeding of hybrid stocks, for stiff land under irrigation, where seepage troubles have to be reckoned with. It is mentioned here mainly on this account, but also because of the part it has played in the breeding of Jacquez and allied vines that were formerly very popular.

V. Candicans.
(*The Mustang.*)

V. Candicans is distributed so widely in the warm southern States that it is often styled the "Riparia of the South." It is one of the strongest growing wild vines, climbing and sometimes smothering the tallest trees. Though its intolerance of lime, difficult cutting-strike, and only moderate phylloxera resistance make it of little practical interest, it has played a part in the breeding of such once popular stocks as Solonis, Novo-Mexicana, and a few others, which are considered to be wild or spontaneous hybrids of V. Candicans, V. Riparia, and V. Rupestris.

HYBRIDS.

No. 554–5: *Aestivalis—Monticola* x *Riparia—Rupestris.*—Raised by Coudere in 1885. According to Ravaz, No. 554-5 shows its mixed descent in various ways; the Rupestris influence is very evident in the leaf; that of Aestivalis perhaps in the bunch, its berries being larger than those of the other three species; that of Riparia in the growth habit, and that of Monticola in the gloss of the leaves and in its aptitudes. Though a quaternary hybrid, and only one quarter Monticola, it seems to inherit some of its most precious qualities from this hot

No. 554-5 is a stock showing wide adaptation in Australia.

climate progenitor—that of drought resistance, for instance. It shows much greater promise under Australian conditions than it has hitherto done in France. Ravaz concedes it to be a plant presenting some interest, but he is certainly not enthusiastic concerning it. He describes it as a vine of medium vigour with rather short canes, that thicken early, and give fairly powerful stems. It strikes well from cuttings. The root system is not fleshy; it is little attacked by phylloxera; the few tuberosities, on yearling roots, are devoid of gravity. On the other hand, it knits very badly when grafted, as do all vines of Monticola breeding; a grave defect that has hindered its use on a large scale. No. 554-5 shows wide adaptation. It tolerates lime; where 3206 and 3309 become yellow, it remains quite green, even when grafted. It has about the same resistance to chlorosis as du Lot, but its grafts are less vigorous, though fruitful.

The writer's attention was first drawn to this stock by the remarkable root development of young plants imported from France, which, like No. 107-11, recalled young asparagus crowns. In subsequent trials it has proved a really excellent stock, and has not shown that grafting perversity attributed to it by Ravaz. Knitting takes place here as freely as with most of our usual stocks, a consequence no doubt of our warmer climate. In other respects, it shows qualities not generally credited to it in France, where it is seldom referred to

in recent vine literature. Its suitability for our warmer climate is not surprising in view of its breeding; its seed-bearing parent (Aest.-Montic.) is the offspring of two hot-climate vines, while its pollen parent (Rip. x Rup.) belongs to a group that is deservedly popular in many of our large vineyards.

In the affinity plots at the Rutherglen Viticultural Station, it is grafted with twenty different scion sorts, with all of which, with the single exception of Terret Bourret, it shows good affinity. There are a few misses among Ohanez and Alicante Bouschet, probably due to other causes, as the survivors are quite satisfactory. Outstanding for vigour and health are Sultana, Zante, Rosaki, Valensi, Grenache, Mondeuse, Mataro, and Carignane. Yield is only moderate in the case of Zante, White Sauvignon, Malbeck, and Clairette. On the other hand, heavy yield and moderate growth are shown by Piquepoul, Montils, Gordo Blanco, Purple Cornichon, and Gianetti. With these, a tendency to overproduction over a series of years has depressed vigour; this, however, is capable of correction by harder pruning.

No. 554-5 seems a good stock for "bad scions"; such notoriously difficult ones as Gordo Blanco, Zante, Ohanez, and Gianetti do well on it. For Gordo, it seems one of the most promising stocks. In comparison with No. 107-11 in an adjoining row, though vigour was somewhat less, this sort on 554-5 bore a heavier crop, with better filled bunches and larger berries. In the ampelographical collection, fifteen other sorts, several of which are different Muscats, are grafted on this stock. In each case affinity is satisfactory.

As regards tolerance of faulty drainage, it seems, at the Viticultural Station, to be about on a par with No. 106-8, i.e., scarcely equal in this respect to Nos. 1202 and A.R.G.1, and definitely less tolerant than Nos. 107-11 and 62-66. In this State, No. 554-5 has been planted, on a rather small scale it is true, in several commercial vineyards with very satisfactory results.

In their important "Barooga" vineyard, in New South Wales, just across the Murray River from the Victorian town of Cobram, Messrs. B. Seppelt and Sons have tried this stock during the past few years. It is reported by their manager to be standing up to local conditions very well indeed. The average annual rainfall at Barooga is about 17 inches, which is scarcely sufficient for Nos. 3306 and 3309 without supplementing by irrigation. No. 554-5 is planted in a part of the vineyard that is not irrigated. So far it has been grafted only with Grenache, with which scion affinity is apparently all that can be desired.

In short, 554-5 is a stock that can be recommended with confidence, especially under dry conditions, and for scion sorts difficult to suit with a stock, as well as for those liable to coulure. Its lack of popularity in France seems due to climatic reasons, but it is strange that its sterling qualities should not have asserted themselves ere this in California or the Cape. There is no mention of this stock in recent literature from these countries.

No. 18804: *V. Riparia* x *V. Monticola*.—Raised by Castel over 30 years ago, but it has attracted attention in France only recently. The allied Nos. 18808 and 18815, of

No. 18804—a Riparia x Monticola hybrid introduced recently to the Rutherglen Viticultural Station.

similar breeding, were also raised by Castel; but 18804 has displaced the others. As will be seen from the illustration, the leaf recalls V. Riparia rather than V. Monticola. Ravaz, indeed, questions the correctness of its reported breeding, holding that the pollinator can scarcely have been a pure Monticola. He suggests that it was probably allied to one of the forms of V. Arizonica. No. 18804 nevertheless shows some Monticola characteristics.

A leaf of No. 13205 which shows decided Monticola facies.

According to Ravaz (14.5.1922), Riparia dominates in this vine, but it is decidedly more vigorous than Riparia and even Riparia Rupestris . . . . for twenty years it had shown superiority to a great number of stocks in experimental plots. Though perhaps less resistant to chlorosis than No. 3309, it might, with advantage, be planted on soils little liable to chlorosis, where, for other reasons, 3309 is not altogether satisfactory. According to recent reports from Montpellier, it maintains its high value. The drought resistance it inherits from its Monticola parent should make it decidedly interesting under Australian conditions.

No. 18804 is a recent addition to the collection of stocks at the Rutherglen Viticultural Station, and has not yet been grafted, but among hitherto untried stocks it appears to be one of those that show most promise.

No. 160–19: *V. Rupestris* x *V. Monticola*—raised by Couderc, who catalogued it as Rupestris x Calcicola (the latter being the name he proposed to substitute for Monticola). Though this stock failed to achieve popularity in France, in which country it is scarcely known to-day, it has been used extensively in Spain, where it was recommended as the most promising stock for Gordo Blanco. Unfortunately, the vines imported by the writer under this designation in 1909 proved to have been wrongly labelled, and were eventually identified as No. 19-52, which has been described previously. The opportunity of testing the real 160-19 under our conditions was thus lost.

No. 13205: *Vinifera — Rupestris* x *V. Monticola,* raised by Couderc; No. 601 (Bourrisquou x Rupestris) being fertilized with pollen of V. Monticola. The leaf shows decided Monticola facies, as can be seen from the illustration. It is a vigorous, though bushy grower. Though resisting chlorosis well, this stock did not meet with much success in France, where its phylloxera-resistance has been questioned; it is reported also as being difficult to graft. Once knitted, however, the grafts thrive. Though imported in 1909, it has not been propagated or tried under our conditions, for which it should be better suited than for the colder French climate.

Monticola hybrid (?): Concerning the identity of this vine, which was imported under the obviously incorrect designation of No. 19–52, we are in doubt. As is evident from the illustration, it is a Monticola hybrid, but which one is by no means clear. It was first thought to have merely changed places with No. 19–52 and therefore be the missing No. 160–19; but it does not agree with descriptions of that vine. Nor is it identical with No. 13205.

There is some doubt about the identity of this Monticola hybrid.

It is mentioned here for the reason that it has proved a really good stock in the affinity plots at the Rutherglen Viticultural Station. It is grafted with nine different scion sorts which are all doing well as regards vigour and affinity. It appears to be a good stock for Gordo Blanco which, together with such other difficult scions as Gianetti and Ohanez, is doing well on it.

Jacquez or Lenoir and Allied Vines.

Passing mention must be made of these once very popular vines. Though they have not served as stocks in Australia and have elsewhere been superseded by the much better ones. dealt with previously, they cannot be ignored altogether. Jacquez is often referred to in quite recent viticultural publications.

The rather legendary early history of these vines is obscure and confused. According to some they originated in Madeira. Jacquez and Herbemont seem to have been cultivated in Georgia and South Carolina over a century and a half ago. The liability of the former to anthracnose and mildew led to its abandonment in the South Eastern States; the more resistant Herbemont continuing in favour. Munson evolved the supposed species *V. Bourquiniana,* to explain their origin, but this is not accepted by French authorities, who regard these vines as ternary hybrids in which the three species, V. Aestivalis, V. Cinerea and V. Vinifera are represented, the first playing the most important part.

Jacquez was introduced into France in the sixties or almost simultaneously with phylloxera. Its ability to survive the pest immediately brought it into favour, first as a direct producer but subsequently as a grafting stock. In the warm Southern Departments, Jacquez was extensively planted for this purpose, its relative lime tolerance enabling it to thrive on land unsuitable for Riparia, the then leading stock. As a direct producer it is still grown to some extent, for it is a good bearer; but mainly on account of the intense colour of its wine. This, however, is not permanent and needs stabilizing by heavy additions of tartaric acid. As a stock, its chief defect is its insufficient phylloxera resistance—only 12 by V. and R. scale. This is inadequate, except in sandy soil where the insect is much less deadly. Susceptibility is greater when a vine serves as a stock. When used as a direct producer it is less attacked.

Under the synonym Lenoir, Jacquez was at one time a popular stock in California; but it has been displaced by the better stocks now

Jacquez or Lenoir, a once popular stock and direct producer.

available. According to Bulletin 331, on Phylloxera Resistant Stocks, issued in 1921 by the University of California, "It is a little difficult to root but takes the graft well and makes excellent unions . . . It has been abandoned almost everywhere, however, owing to its low resistance to phylloxera, which is sufficient only in rich deep moist soils." Its popularity has continued longer at the Cape, where it was very popular and is still used as a stock for Hanepoot (Gordo Blanco). In Bulletin No. 10, issued by the South African Department of Agriculture in 1927, Van Niekerk and Theron state "Jacquez is still to-day one of our best stocks, provided it is planted in the right soil . . . . . i.e., loose soil which absorbs water well and does not dry out too much or contain impervious layers. In the sandy soil of Goudini and elsewhere it still ranks among the best and produces very even vineyards which bear regularly . . . . . but its vigour is too weak in unsuitable soils and, as soon as the vine gets older, it degenerates and no longer produces good grapes."

Herbemont, of similar breeding to Jacques has not been used so extensively as a stock, though its resistance is slightly better (13 V.

and R. scale). As a direct producer, it was at one time popular. It is a heavier bearer, more resistant to disease, and its grapes are of much lighter colour than Jacquez. If pressed immediately they produce a white wine of good body and fair quality.

The other Aestivalis hybrids mentioned do not present sufficient practical interest to need description here. They are of similar breeding to Jacquez and Herbemont, except Norton's Virginia, better known in France as Cynthiana. This was at first thought to be a pure Aestivalis, but is now looked upon as a Labrusca Aestivalis hybrid.

Solonis is another old time stock, that was formerly popular, but has been abandoned owing to its insufficient resistance (14 V. and R.). Its origin has been much discussed. Munson considers it to belong to a definite species, *V. Longii* of Prince, the specific nature of which is denied by French authorities. The name "Solonis," which originated in the Berlin Botanic Gardens, is said to be a corruption of V. Longii, that resulted from a partly obliterated label. French authorities do not recognize V. Longii, but look upon this group, that includes Solonis, the allied Novo Mexicana and some similar vines, as complex spontaneous hybrids, in which the three species, Riparia, Rupestris and Candicans, are represented. Solonis grows fairly true from seed, a fact that is scarcely in keeping with a hybrid origin, and which has been urged by Munson in support of the specific nature he claims for V. Longii. Solonis thrives on cool sandy soil; it is fairly lime tolerant and also tolerates salty soils. It nourishes vines grafted on it well, and reduces the tendency to coulure. Though abandoned to-day, some of its hybrids are considered good stocks for soils of moderate lime content; notably No. 1616 (Solonis x Riparia) which is more particularly recommended for salty soils.

Other Solonis hybrids that show promise are No. 215–1 of Castel, (Solonis x Rupestris du Lot), a strong growing vine, said to be an excellent stock for soils of moderately high lime content and No. 31 R (Berlandieri x Novo Mexicana) which has been described previously among the Berlandieri hybrids.

Some Vinifera x Rupestris Hybrids.

Brief reference must now be made to a few stocks of similar breeding to the familiar No. 1202 and A.R.G.1, so favorably known in our vineyards. Some of these are of interest under special circumstances; they seem to merit further trial in Australia.

No. 93–5—*Bourrisquou* x *Rupestris,* raised by Coudere many years ago. The seed-bearing parent is a vine, notable for its health and vigour, that he used extensively in the raising of new hybrids. It is a chance seedling found in the early fifties, in the woods near Aubenas (Ardèche Department) that soon became popular owing to its resistance to oidium, at that time, a new pest in France. The new vine was disseminated chiefly by a travelling hawker who used a donkey to transport his wares. The local term for this animal is *Bourrisque*—hence the name Bourrisquou. No. 93–5 has been planted only on a small scale in France. In Spain it is far better known and is held in high esteem in most soils where phylloxera does not prove dangerous. Ravaz classes its

No. 93-5—a Borrisquou x Rupestris hybrid which may prove superior to A.R.G.1.

resistance as being on a par with that of No. 1202; he states that no weakening due to the insect has been reported in France. It is a very strong grower, and this may lead to coulure, with scion sorts that are liable to this accident. It is reported to tolerate salty soil conditions better than most other stocks. At the Rutherglen Viticultural Station it was only recently imported and has not yet been tested. It aroused interest owing to the marked drought resistance of two Spanish grapes, Calagraño and Miguel de Arco, that were grafted on this stock. These vines, imported some 25 years ago, stood remarkably well in severe droughts.

No. 601—of similar breeding to No. 93-5 and considered to be on a par with A.R.G.1.

The same scion sorts, grafted on other stocks, do not show this resistance, for which the stock would seem responsible.

No. 93–5 thus presents considerable interest: it may, on further trial prove even superior to A.R.G.1. It should not, however, be used for sorts liable to coulure, on rich soil, nor in very dry situations, where its resistance may not prove adequate.

No. 601 *Bourrisquou* x *Rupestris*—of similar breeding to the No. 93–5. Raised by Couderc in 1883 and first recommended as a direct producer, but abandoned as such and used as a stock; it proved rather refractory to grafting, a defect less to be feared in our warm climate. It is chiefly notable for its phylloxera resistance which Ravaz holds to be superior to that of all other members of the Vinifera—Rupestris group. At the Rutherglen Viticultural Station it is satisfactory and about on a par with A.R.G.1.

No. 3103 or *Gamay Couderc—Colombeau* x *Rupestris Martin*—Raised by Couderc in 1882. The seed-bearing parent is a strong-growing white grape from Provence capable of thriving on poor dry soils. Disappointing as a direct producer owing to poor yield and inferior wine, No. 3103 was recommended as a stock. It is a very strong grower that strikes and grafts readily and shows high lime tolerance, though not quite equal to that of No. 1202. On the other hand its resistance is scarcely sufficient for dry shallow soils. Its great vigour also tends to aggravate coulure. It is mentioned here chiefly on account of its tolerance of salt which is said to be of a high order.

In the affinity plots at the Rutherglen Viticultural Station, No. 3103 is grafted with 16 different scion sorts. In the case of Zante, Gianetti and Ohanez, affinity is definitely faulty. Gordo Blanco and all the other sorts tried are quite satisfactory; Montils, in particular, being remarkably vigorous and fruitful. Apart from its salt tolerance, it does not seem superior either to A.R.G.1 or No. 1202.

No. 3103, whose chief characteristic is tolerance of salty conditions.

Orchard and Garden Notes

By Edward E. Pescott, F.L.S.

The Flower Garden.

THE time of the Dahlia is about due; many early-planted ones are already flowering; but the best blooms are those that come from March to May.

As the plants increase in height they should be supported by firmly-driven stakes, but tied so loosely that the growth of the stems will not be restricted. The brittle character of the plants demands support; further, they are in full growth at a time when winds are likely to be prevalent.

They should be well fed, either with a dressing of stable manure or with a good handful of blood manure. Failing this a weekly light sprinkling with liquid sulphate of ammonia will give good results. There should be no cultivation around the plant beyond a light forking of an inch or two, for the tubers form near the surface, and if they are damaged, no matter how slightly, rotting and fungus troubles may follow.

To obtain the fine long-stemmed flowers so needed both for house and garden decoration, the stems should be disbudded. If a stem be closely examined when the growth is quite young, a central bud will be noticed and at the sides of this small shoots will also bear buds. These side shoots should be rubbed or cut off so that the stem will produce one long-stemmed flower. Gardeners need not fear that this disbudding will appreciably reduce the number of flowers, for at this period of the year the plants produce many stems.

The Vegetable Garden.

This is the time when attention should be given to the sowing of seed for winter vegetable crops; these include cauliflower, cabbage, kale, sprouts, turnip, parsnip, carrot, beet, &c.

All root crops should be sown in rows and in the place where they are to remain. The other seeds should be sown in seed-beds for transplanting later in the year. The soil of the seed-beds should be quite poor and sandy; if it is rich it will produce a strong growing succulent plant, quite unsuitable for transplanting. The type of plant required for transplanting in March or April is a hardy, sturdy one with a few leaves of tough, deep green character. Such a plant recovers very quickly from the transplanting and soon establishes itself in the garden. Weak, tall, leggy and succulent plants take a long time to recover, and thus retard the development of the crop.

Cactus Dahlia.

After sowing, all seed-beds and rows should be covered with a dressing of hand-rubbed leaves or leaf mould, very old chaff, grass or old broken manure.

The Orchard.

Emphasis must be placed on the remarks made last month regarding the checking of red scale in citrus trees. According to the regulations all citrus trees in the State, if infected with scale, must either be sprayed with an oil spray, preferably white oil, 1 in 35, or they must be fumigated.

Apple and pear-growers should now give attention to the late sprays for codling moth, so that the fruit may be kept free from attacks of the late broods. When the fruit is to be washed or wiped after harvesting, the usual arsenate of lead spray may be given; otherwise a white oil spray, at the rate of 1 in 60. A small quantity of spreader may be required with the late oil applications.

Irrigated Pastures

The Effects of Spelling for Varying Periods

By E. T. Beruldsen, B.Sc. (Agric.), Senior Irrigation Officer; and A. Morgan, B.Agr.Sc. Irrigation Field Officer.

IRRIGATION farmers fully recognize the importance of adequate watering and topdressing in the maintenance of irrigated pastures of grasses and clovers in flourishing condition. Indeed, the information acquired at pasture competitions, &c., reveals that relatively little divergence exists in the watering methods of farmers working under similar soil conditions, while topdressing with superphosphate usually is consistently carried out. However, wide divergence does exist in the methods by which the pasture is utilized, through the variation in stocking and system of grazing. Extreme cases could be cited where the pasture is being used almost continuously for night grazing. Some years ago this system was closely associated with the fact that mixed pasture under irrigation was a new development, and very often a few acres of pasture was called upon to do twice or even three times the work of an equivalent area elsewhere on the farm. In other cases the pasture too frequently was allowed to reach a stage where it had to be cut for meadow hay, or was stocked so leniently that much waste resulted from the development of rank patches (7).

Most farmers adopt perforce the principle of rotational grazing, but too little is known regarding the effect of variation in the length of the recuperative period between grazings on the yield and quality of the herbage. For some time it has been observed that in mixed pasture the grazing system employed profoundly influences the balance of the various species. It is generally conceded that the aim should be to retain a desirable balance between species, and particularly between grasses and legumes. This results in better distribution of production throughout the year, and further the herbage offering in a well-balanced sward appears more palatable.

A particularly important phase of irrigated pasture management is the control of white clover. A sward which is dominantly leguminous presents difficulty in that the risk of "bloat," particularly in dairy cattle, is enhanced. During the irrigation season, white clover provides the bulk of the herbage over an extended period, and, with the attention which has been paid in recent years to watering and topdressing, not only has the original white clover sown been encouraged to the point of exclusion of other species in some cases, but also the development of particularly vigorous regional strains has enhanced the difficulty of maintaining a good grass-clover balance. In view of the importance of this aspect of pasture management, it was decided in 1933 to conduct an investigation at the State Research Farm, Werribee, to test the effect of spelling for varying periods on the production, botanical composition, and chemical composition of a typical cow pasture under irrigation. It was considered that the use of the motor mower, while providing a means of accurate measurement and facilities for accurate sampling for chemical analyses, would not detract in any way from the practical application of the results obtained, particularly since the best systems of grazing involve a defoliation of the pasture almost as complete as that effected by the mower. Although the plots of this series were cut according to a strict time-table in order to obtain accurate comparisons, it is fully realized that under practical conditions some latitude should exist in respect of time elapsing between successive *complete* grazings.

The plots occupy one bay in a paddock sown down in 1923 with the following mixture :—

	Lb. per acre.
Perennial rye grass	12
Cocksfoot	4
Lucerne	2
Perennial red clover	1
Alsike clover	1
White clover	1
Strawberry clover	1
Subterranean clover	1
	23

Up to the commencement of this test in 1933, the pasture was regularly grazed by the dairy herd, and by that time the alsike, red clover, and lucerne were unimportant constituents of the herbage, while a volunteer species—prairie grass—was well-distributed and conspicuous, especially in

Mowing the Frequency of Cutting Tests, State Research Farm, Werribee.

winter. Owing to the regular watering, subterranean clover was not an important element (1). There are seven treatments, replicated six times in randomized blocks. The treatments are as follows :—

A.—Cut weekly.
B.—Cut fortnightly.
C.—Cut three-weekly (22 and 23 days, alternately).
D.—Cut monthly.
E.—Cut five-weekly (37 and 38 days, alternately).
F.—Cut eight-weekly.
G.—Cut for meadow-hay, then three-weekly (22 and 23 days, alternately).

TABLE 1.—MONTHLY RAINFALL AND IRRIGATION, FREQUENCY OF CUTTING TEST, 1933–34.

	Rainfall.	Number and Date of Irrigation.	Approximate Amount of Water : Rain + Irrigation.
	(Inches).		(Inches).
1933—			
August ..	1·50	..	1·50
September ..	1·09	1. 27.9.33	3·59
October ..	1·22	2. 21.10.33	3·72
November ..	2·00	3. 17.11.33	4·50
December ..	3·29	..	3·29
1934—			
January ..	2·22	4. 5.1.34	7·22
		5. 24.1.34	
February ..	1·37	6. 15.2.34	3·87
March ..	·21	7. 2.3.34	5·21
		8. 22.3.34	
April ..	4·63	..	4·63
May ..	·18	..	·18
June ..	1·10	..	1·10
July ..	·91	..	·91
Totals ..	19·72	..	39·72

Every sixteen weeks, all plots are thus cut on the same day.

The plots are 33 feet by 10 feet, being slightly larger than the " optimum " size determined by a uniformity test on this pasture (4).

Each year since its establishment the pasture has received superphosphate at the rate of 1 to 2 cwt. per acre. For this test, an autumn dressing of 2 cwt. per acre has been adopted. The first dressing was delayed till 20th July, 1933, but in 1934 the superphosphate was applied on 13th April.

The monthly rainfall for the season 1933–34 is shown in Table 1. No measurement of the irrigation water applied was possible, but based on previous experience of the irrigation of the entire paddock it can be stated that the average watering was approximately 2½ inches. Eight waterings, totalling about 20 inches of irrigation water, were given as required through the season.

EFFECT ON YIELD.

(*a*) *Total yield for the Season.*—The yields of dry matter per plot of 9/200th acre for the 48 weeks period from 29th August, 1933, to 31st July, 1934, are shown in Table 2. It will be seen that there are progressive, statistically significant *increases* in yield as the interval between mowings is lengthened, up to eight weeks. Compared with eight weeks, there is a significant but smaller *decrease* in the yield from the " meadow-hay " plots.

(*b*) *Distribution of the Yield.*—From Table 2 it will be seen that the progressive increases in yield as the interval between mowings is increased are

TABLE 2.—TREATMENT TOTALS, FREQUENCY OF CUTTING TEST, 1933-34.

(Pounds of Dry Matter per 9/200th acre).

Treatment.	29.8.33 to 19.12.33.	19.12.33 to 10.4.34.	10.4.34 to 31.7.34.	Totals.
Cut weekly ..	178·3	104·8	30·2	313·3
Cut fortnightly	206·4	120·7	33·3	360·4
Cut 3-weekly ..	224·3	119·4	32·4	376·1
Cut 4-weekly ..	258·4	113·5	30·2	402·1
Cut 5-weekly ..	276·0	113·7	30·2	419·9
Cut 8-weekly ..	320·9	110·9	33·1	464·9
Cut for hay, then 3-weekly ..	314·5	112·3	27·8	454·6
Totals ..	1,778·8	795·3	217·2	2,791·3

most marked in the first 16-weeks period,* which included the spring growth, and that during this period over 50 per cent. of the total yield was produced in every treatment. In the second 16-weeks period,* from 19th December, 1933, to 10th April, 1934, the "fortnightly" and "three-weekly" plots produced the greatest yield of dry matter, showing a significant increase compared with the "weekly" and "eight-weekly" plots. The plots cut at intervals longer than two or three weeks gave smaller yields because of the reduction in the amount of white clover caused by the vigorous spring growth of the grasses.

During the third 16-weeks period,* from 10th April, 1934, to 31st July, 1934, the low yields of all plots are characteristic of the winter production of an irrigated pasture with dominant perennial species. While the "meadow-hay" plots alone show a significant difference in yield, their low yield in comparison with other treatments being due largely to the opening-up of the sward following the hay cut, the "fortnightly" and "three-weekly" plots are still better than the "weekly" "monthly," and "five-weekly" plots. The "eight-weekly" plot in this period shows to advantage, compared with its yield in the second period, and this is due to more vigorous grass growth. (See Table 8). The "fortnightly" and "three-weekly" plots owe their superiority in the second period to the same cause.

Table 3 shows that from 57 per cent. to 69 per cent. of the total yield was produced in the first period, the less frequently-cut plots showing the higher percentages. In this respect they show to disadvantage, compared with the more-frequently-cut plots, as far as yield-distribution is concerned, but as there are such small differences in the yield of all plots (the "three-weekly" is about 10 per cent. better than the "weekly" or "monthly" in the second period, and 6 to 7 per cent. better in the third period), this feature does not seem to have much practical application.

The reason for the improved yield-distribution of the frequently-cut plots is found in the changes in botanical composition induced by frequent cutting. It must be borne in mind that the first year of this test includes a period of adjustment to treatment, and results of the kind described may not be so definite in the second and succeeding years. A graph of the yields from the "weekly" plots illustrates the rapid changes in growth-rate of herbage which take place during the season, but owing to the great changes in botanical composition rapidly induced by the weekly cutting the results cannot be taken as strictly typical of an irrigated pasture. (See Fig. 1.)

The graphs of the plots cut at longer intervals show production peaks similar to those shown for the Rate and Frequency of Watering Tests (1).

Richardson (2), found that "the monthly yields of pasture under irrigation followed closely the mean maximum air temperatures, except in early summer when the effects of temperature were partially obscured by the 'zenith period of growth' of the major species in the pasture." This is not corroborated in this test. (See Fig. 2). In the instance quoted, owing to the shallow free-water table, moisture conditions were probably more nearly constant than in most irrigated pastures.

TABLE 3.—PERCENTAGES OF THE TOTAL YIELD PRODUCED DURING EACH 16-WEEKS PERIOD UNDER DIFFERENT MOWING TREATMENTS.

Cutting Period.	Cut Weekly.	Cut 2-weekly.	Cut 3-weekly.	Cut Monthly.	Cut 5-weekly.	Cut 8-weekly.	Cut 3-weekly after Meadow Hay.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
1st 16-weeks ..	56·9	57·3	59·6	64·3	65·7	69·0	69·2
2nd 16-weeks ..	33·5	33·5	31·8	28·2	27·1	23·9	24·7
3rd 16-weeks ..	9·6	9·2	8·6	7·5	7·2	7·1	6·1
	100·0	100·0	100·0	100·0	100·0	100·0	100·0

* To be referred to as the first period, second period, third period.

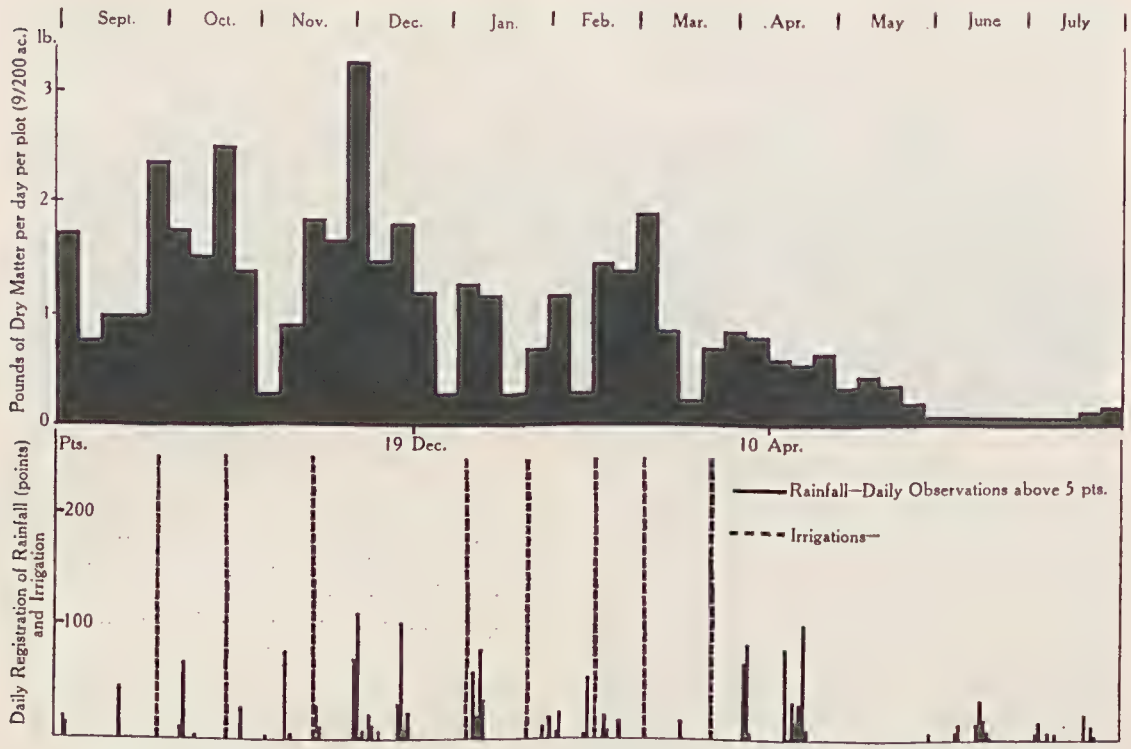


Fig. 1.—Showing daily production of dry matter per plot for each weekly period, and the incidence of rainfall and irrigations—29.8.33 to 31.7.34.

Comparing Richardson's figures for 28-day and 56-day cutting with those obtained in this test, we get a mean increase in yield, in favour of the "eight-weekly" plots, of 12·6 per cent. compared with his figure of 28·5 per cent. The increase varied from 32·1 per cent. to a *decrease* of 10·8 per cent. over comparable periods. However, the pasture tested by Richardson was only a few months old at the beginning of his investigations, and the cocksfoot and white clover had not attained full development.

EFFECT ON BOTANICAL COMPOSITION.

The method used was the percentage estimation method (3) and six estimations were made on each of the six replicates of each treatment immediately before cutting.

(*a*) *Influence of cutting treatment on Total Yield of Grass, Legumes, and Weeds.*—Table 4 shows that the production of the grasses increased as the time between cuts was increased, the greatest amount of dry matter being obtained from the grasses on the "meadow-hay" plots. The production of the legumes was in general inversely affected, although there was very little difference between the "weekly," "fortnightly," "three-weekly," and "monthly" plots.

TABLE 4.—PRODUCTION OF GRASS AND CLOVER UNDER DIFFERENT CUTTING TREATMENTS.

(As pounds of dry matter per Plot of 9/200th acre.)

Treatment.	Grasses.	Valuable Legumes.	Weeds.
Cut weekly	125·1	184·6	1·4
Cut fortnightly ..	168·3	177·1	3·3
Cut 3-weekly	183·3	188·6	4·2
Cut 4-weekly	207·7	188·0	6·4
Cut 5-weekly	246·9	166·4	6·6
Cut 8-weekly	310·0	147·6	7·3
Cut for hay, then 3-weekly	369·0	74·3	8.6

This has a particularly important bearing on rotational grazing as practised on the average dairying block under irrigation. There is a tendency during the feed shortage from late autumn to early spring to shorten the rest period between grazings, and this intensifies clover-dominance during the irrigation season to an undesirable extent. The value of a rest period of about a month is evident when, without appreciably

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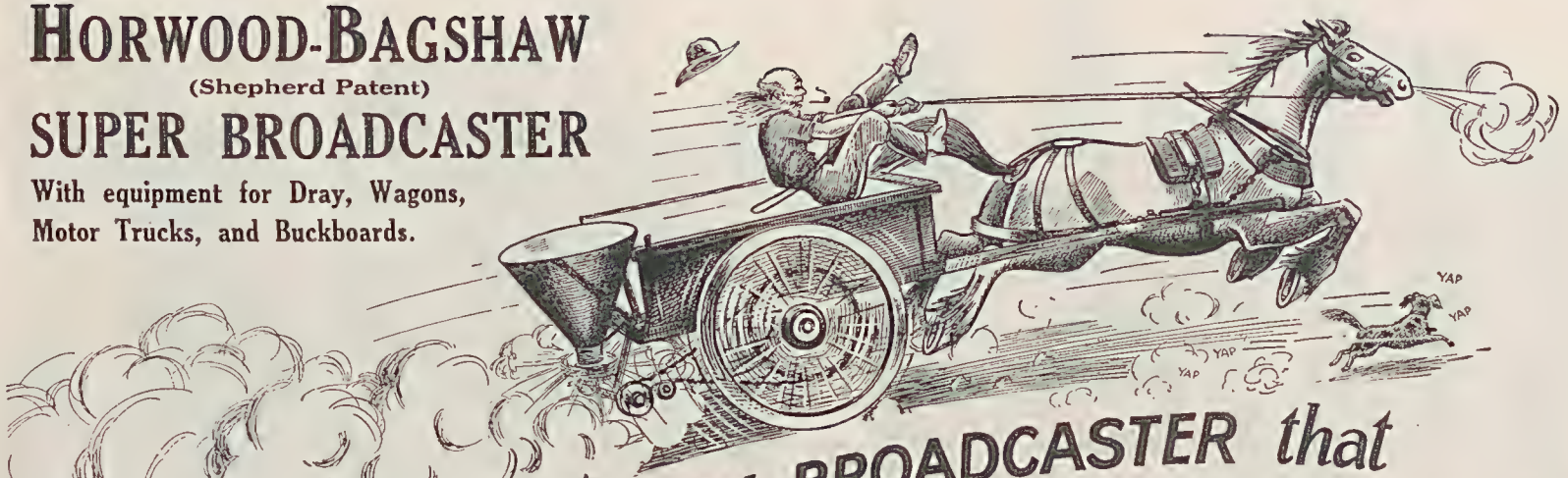

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lessening the *amount* of clover produced by the pasture, its *percentage* in the herbage is reduced because of the extra growth of grass as compared with that obtained with shorter rest periods. The maintenance of good carrying capacity associated with a botanically balanced ration is a major aspect of pasture management, and it appears that on irrigated pastures a system of monthly grazings would produce this desired result. In practice smaller intervals would have to be adopted at the spring flush to cope with the heavy growth, but the month's rest is particularly important during the lean period referred to.

The weed production is a most interesting feature of the test. The results obtained for the grass and legumes are in accordance with numerous other tests in various countries on dry pastures, but it was the usual experience in those tests that the frequent mowing encouraged weed development. The weeds in this test were dock (*Rumex crispus L.*), and wild pepper-cress (*Lepidium virginicum L.*) mainly, with a small representation of red-flowered mallow (*Modiola caroliniana* L. Don), and yellow wood-sorrel (*Oxalis corniculata* L.). The *oxalis* was noted to increase with frequent mowing, but this was outweighed by the dock and pepper-cress, which became more prominent as the intervals between cuttings was increased. Had flatweeds (*Hypochaeris* spp.) been the main weeds present, results similar to those noted elsewhere would probably have been obtained.

TABLE 5.—PERCENTAGE COMPOSITION OF HERBAGE UNDER DIFFERENT CUTTING TREATMENTS.

Treatment.	Grasses.	Legumes.	Weeds.
Cut weekly	40·2	59·3	·5
Cut fortnightly ..	48·3	50·8	·9
Cut 3-weekly	48·7	50·2	1·1
Cut 4-weekly	51·6	46·8	1·6
Cut 5-weekly	58·8	39·6	1·6
Cut 8-weekly	66·7	31·8	1·5
Cut for hay, then 3-weekly	81·7	16·4	1·9

Table 5, in which is set out the percentage composition of the total dry matter, shows the increase of weeds with lenient cutting, so that the foregoing result is not a matter of increased yield of total herbage. This Table shows that the change-over from clover to grass dominance occurred at the monthly plots, roughly.

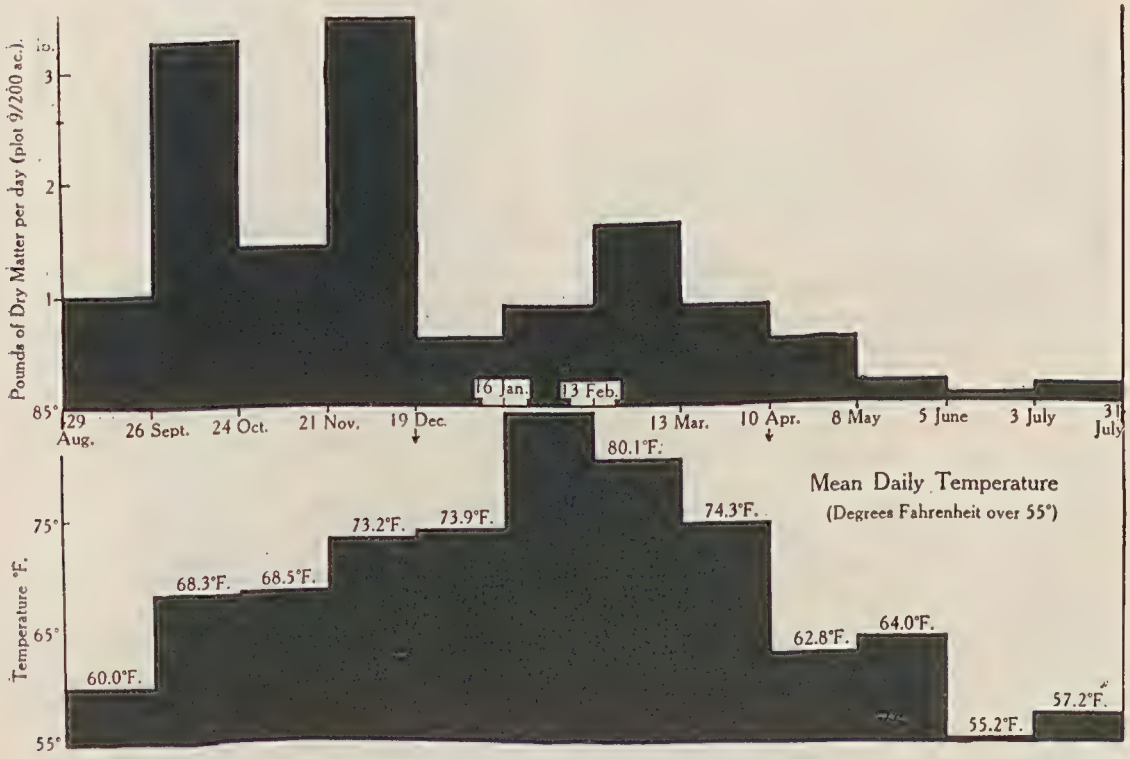
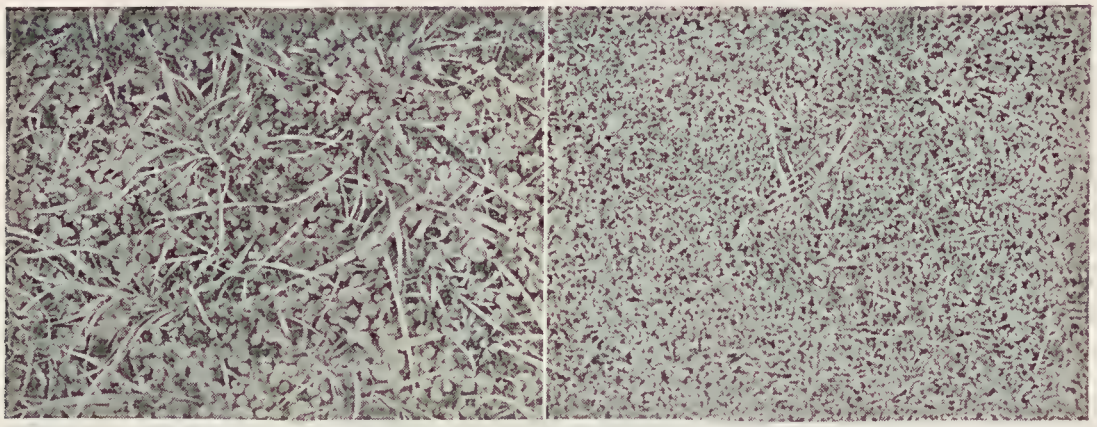


Fig. 2.—Showing mean daily production of dry matter and mean daily temperature for each four-weekly period—29.8.33 to 31.7.34.



Showing the composition of pastures on two equal areas, under different cutting treatments. Left, 5-weekly; Right, weekly.

The "fortnightly" and "three-weekly" plots show practically the same composition, with a large decrease in clover percentage as compared with weekly cutting. Under the system of monthly cuts, considering the whole season, a herbage is obtained which is well-balanced as regards grass and legumes.

(*b*) *Species production under the various cutting treatments* :—

1. Grasses. (See Table 6). Except for a slight drop in the case of the "five-weekly" plots, which is associated with a sudden increase in cocksfoot production, and a decrease of prairie grass and miscellaneous grasses (practically all *Poa annua* L.), the rye grass production is benefited by lenient cutting; the same statement holds for prairie grass and miscellaneous grasses.

The cocksfoot production increases up to the "eight-weekly" plot, then shows a slight decrease with the "meadow-hay" plot. The percentage contribution of each species is shown in Table 7, and these differ widely from the above. They show that the importance of rye grass, prairie grass, and miscellaneous grasses in the herbage was not materially altered by the cutting treatment, except on the "meadow-hay" plot, while the importance of the cocksfoot in the herbage increased with lenient cutting up to the "eight-weekly" plots and the "meadow-hay" plot showed then very little difference.

The prairie grass response is of particular interest in view of the fact that this species usually disappears under grazing, unless lenient, and it was expected that under frequent cutting it would rapidly diminish in importance in the herbage—actually it contributed about the same percentage on all the treatments except the "meadow-hay" viz., about 3½ per cent. The actual dry matter produced by it, as mentioned, increased with more lenient cutting.

Table 8 shows the production of dry matter by the grasses for each 16-week period, and shows a marked effect of *time of cutting* on the rye grass and cocksfoot.

Table 6.—Production of Species under Different Cutting Treatments.
(Pounds of dry matter per Plot of 9/200th acre).

Treatment.	Rye Grass.	Cocksfoot.	Miscellaneous Grasses.	Prairie Grass.	White and Strawberry Clovers.	Miscellaneous Legumes (Red Clover, Alsike, Lucerne, Sub. Clover).	Weeds.
Cut weekly ..	19·3	87·7	6·4	11·7	182·9	1·7	1·4
Cut fortnightly ..	19·5	130·1	6·1	12·6	173·6	3·5	3·3
Cut 3-weekly ..	24·0	140·2	8·0	11·1	186·0	2·6	4·2
Cut 4-weekly ..	32·2	152·1	9·0	14·4	186·1	1·9	6·4
Cut 5-weekly ..	29·7	196·1	7·7	13·4	160·6	5·8	6·6
Cut 8-weekly ..	34·7	246·3	13·1	15·9	137·4	10·2	7·3
Cut for hay, then 3-weekly ..	80·0	242·2	21·6	25·2	71·6	2·7	8·6

TABLE 7.—PERCENTAGE COMPOSITION OF HERBAGE UNDER DIFFERENT CUTTING TREATMENTS.

Treatment.	Rye Grass.	Cocksfoot.	Miscellaneous Grasses.	Prairie Grass.	White and Strawberry Clozers.	Miscellaneous Legumes (Red, Alsike, Lucerne, Sub. Clozer.).	Weeds.
Cut weekly ..	6·2	28·2	2·0	3·8	58·8	·5	·5
Cut fortnightly ..	5·6	37·3	1·8	3·6	49·8	1·0	·9
Cut 3-weekly ..	6·4	37·3	2·1	2·9	49·5	·7	1·1
Cut 4-weekly ..	8·0	37·8	2·2	3·6	46·3	·5	1·6
Cut 5-weekly ..	7·1	46·7	1·8	3·2	38·2	1·4	1·6
Cut 8-weekly ..	7·5	53·0	2·8	3·4	29·6	2·2	1·5
Cut for hay, then 3-weekly ..	17·7	53·6	4·8	5·6	15·8	·6	1·9

While from one to eight-weekly cutting it is shown that more lenient cutting leads to increased cocksfoot production, the "meadow-hay" gave less cocksfoot than was produced by two cuts at intervals of eight weeks. Conversely, in the second period the "meadow-hay" plot (now cut every three weeks) gave a *higher* yield than the "eight-weekly," while the "three-weekly" gave *much less.*

The explanation of these results seems to be that the lower yield of cocksfoot on the "meadow-hay" in the first period is due to the occurrence of the zenith period of growth of rye grass prior to the meadow-hay cut, whereas this was curtailed severely by the first cut of the "eight-weekly." Thus the rye grass production was 72.0 lb. dry matter on the former, and only 31.5 lb. on the latter, and the competition of rye grass on the "meadow-hay" reacted unfavourably on the cocksfoot. In the second period, the cocksfoot cut every three weeks on the "meadow-hay" yielded better because of a less severe drain on the plant reserves during the first period, compared with the "eight-weekly". On the other hand, the drastic reduction of reserves caused by 32 weeks of "three-weekly" cuts, aided by competition from white clover, caused a small yield of only 48.8 lb. dry matter, compared with 71.5 lb. dry matter from the "meadow-hay." The competition from white clover becomes appreciable when the grasses are regularly cut while still showing relatively short growth.

TABLE 8.—PRODUCTION OF SPECIES, FOR EACH SIXTEEN WEEKS PERIOD, UNDER DIFFERENT CUTTING TREATMENTS.

(Pounds of Dry Matter per Plot of 9/200th acre).

Species.	Period.	Treatment. A.	B.	C.	D.	E.	F.	G.
A.—Grasses.								
Rye-grass ..	1	15·4	14·7	18·7	27·4	25·3	31·5	72·0
	2	3·0	3·6	4·2	3·8	3·8	2·2	6·5
	3	·9	1·2	1·1	1·1	·6	1·0	1·5
Cocksfoot ..	1	60·2	83·6	78·2	92·3	117·5	165·7	156·4
	2	21·7	36·4	48·8	48·3	64·7	65·9	71·5
	3	5·8	10·1	13·1	11·5	13·8	14·7	14·3
Miscellaneous Grass	1	5·8	5·8	6·9	8·6	7·4	12·7	21·0
	2	·4	·2	1·0	·3	·3	·3	·3
	3	·2	·1	·1	·1	Trace	·1	·2
Prairie Grass ..	1	9·8	9·7	8·8	11·2	10·6	12·5	23·0
	2	·1	·3	·7	1·3	1·6	1·4	·7
	3	1·8	2·6	1·6	1·9	1·2	2·1	1·5
B.—Legumes.								
White and Strawberry Clover	1	85·0	88·1	107·7	115·7	107·4	89·2	33·5
	2	76·7	66·5	62·2	55·4	39·7	34·2	28·5
	3	21·2	19·0	16·2	15·0	13·5	14·0	9·6
Miscellaneous Legumes (Red Clover, Alsike, Lucerne, Sub. Clover).	1	1·5	3·3	2·4	·6	3·8	4·8	1·4
	2	·1	·3	·2	1·0	1·4	4·6	·5
	3	·1	·1	·1	·3	·7	1·0	·9
C.—Weeds.								
Weeds	1	·7	1·2	1·6	2·6	3·9	4·6	6·7
	2	·6	1·7	2·3	3·4	2·2	2·4	1·6
	3	·1	·3	·4	·4	·5	·3	·4

TABLE 9.—YIELD DISTRIBUTION OF SPECIES.

Species.	Peak Period.	Influence of Dry Jan.-Feb.	Lowest Winter Production.	First Revival from Winter Low-Production.
Rye-grass ..	October ..	Low production	June ..	July
Cocksfoot ..	December	Low production	June ..	July
Prairie grass ..	Sept.-Oct. (according to cutting treatment)	Very low production	May-June (according to cutting treatment)	July
Miscellaneous grasses (mainly *Poa annua. L.*)	October .. (according to cutting treatment)	Very low production	June .. (according to cutting treatment)	July
White clover + strawberry clover	December	Low production	June ..	July

2. CLOVERS.—White clover production decreases with lenient cutting, while that of miscellaneous legumes appears to increase. Red clover was the main member of the latter group, and reached highest production on the "eight-weekly" plot, with a sharp reduction on the "meadow-hay."

The percentage figures show this is not merely a reflection of total yield of herbage. Cocksfoot competition in the first period, and too frequent cutting in the second and third periods, undoubtedly led to the decrease in red clover on the "meadow-hay."

3. WEEDS.—These have already been discussed.

(*c*) *Distribution of the yield of species under varying cutting.*—Table 9 shows the main features of the yield-distribution of the various species, and as a general rule the cutting treatment did not alter the yield-distribution to any great extent. Notable exceptions were that on the "monthly" plots, as compared with the monthly totals of the "weekly" and "fortnightly" plots, the prairie-grass distribution was affected for May-June, and that of cocksfoot was different in September-October. These results are quite understandable in the light of the work of Jones

TABLE 10.—PERCENTAGE OF BARE SPACE UNDER VARIOUS CUTTING TREATMENTS.

Cutting Treatment.	Bare Space.			
	1st 16 Weeks. per cent.	2nd 16 Weeks. per cent.	3rd 16 Weeks. per cent.	Whole Season. per cent.
Cut weekly ..	14·3	5·8	3·9	8·0
„ fortnightly ..	9·0	6·9	5·9	7·3
„ three-weekly	5·1	12·7	8.0	8·6
„ monthly ..	3·1	16·4	8·7	9·4
„ five-weekly	1·1	12·9	15·7	9·9
„ eight-weekly	·2	5·9	9·4	5·1
„ for meadow hay, then three-weekly	10·9	23·6	12·9	17·0

(6), and further results of this nature will be presented when reporting on the second year's results from this test.

(*d*) *Bare Space.*—The visible bare space was estimated six times on each plot at each cut, but this method was not entirely satisfactory, since a high percentage of bare space might be apparent for a period on an infrequently-cut plot, and yet be non-existent at the date of cutting. To overcome this, the system has been changed so that six estimations are made *each week* on each plot, whether to be mowed or not, but a full year's results are not yet available.

Table 10 shows the figures obtained under the first system, the total bare space points obtained in each sixteen-week period being expressed as a percentage of the points possible. These percentages are comparable within treatments, and also between the "meadow hay" and the "three-weekly" for the last 32 weeks of the season.

The main features of the Table are—

(1) The progressive decrease of bare space with weekly and fortnightly cutting, from the first to the third period, due to the increased ground-cover of the white and strawberry clovers.

(2) The high percentage of bare space shown by the "three-weekly," "monthly," and "five-weekly" plots during the summer (second) period.

(3) The high percentage of bare space maintained on the "meadow hay" as compared with the "three-weekly" plot. This last point, showing the bad effect of the meadow-hay cut in opening up the sward, is worthy of attention because a meadow hay cut is frequently recommended as a practical method, less costly than nitrogenous manuring, for the checking of excessive clover-dominance: this test shows, as well as can be shown without actual grazing trials, that the grasses can be maintained in good proportion in the herbage, without an undesirable opening-up of the sward, by the practice of monthly or five-weekly grazings under a rotational scheme.

TABLE 11.—FODDER ANALYSES.

Treatment.	Silica-Free Dry Matter of Cuts Analysed.	Chemical Composition of Silica-Free Dry Matter.			
		Ash.	Protein.	Fibre.	Nitrogen-Free and Fat.
	lb.	lb.	lb.	lb.	lb.
Weekly ..	247·5	22·2	79·4	38·4	107·5
Fortnightly ..	321·4	30·2	92·8	56·3	142·1
3-weekly ..	343·2	31·3	88·1	65·7	158·1
Monthly ..	365·4	33·0	85·7	75·1	171·6
5-weekly ..	409·5	35·8	88·4	87·9	197·4
8-weekly ..	453·9	36·2	80·3	112·9	224·5
Hay, then 3-weekly	443·0	31·0	73·2	114·1	224·7

Treatment.	Percentage Chemical Composition of Silica-Free Dry Matter.			
	Ash.	Protein.	Fibre.	Nitrogen-Free and Fat.
	per cent.	per cent.	per cent.	per cent.
Weekly ..	9·0	32·1	15·5	43·4
Fortnightly ..	9·4	28·9	17·5	44·2
3-weekly ..	9·1	25·7	19·1	46·1
Monthly ..	9·0	23·5	20·5	47·0
5-weekly ..	8·7	21·6	21·5	48·2
8-weekly ..	8·0	17·7	24·8	49·5
Hay, then 3-weekly	7·0	16·5	25·8	50·7

EFFECT ON CHEMICAL COMPOSITION.

(*a*) *Sampling technique.*—A tin 3 inches in diameter and 3 inches high was filled with thoroughly mixed herbage from each plot after cutting and weighing.

(*b*) *Analysis.*—The samples were forwarded to the Agricultural Research Chemist (Mr. W. R. Jewell), and were analysed separately for moisture, after which a composite sample from the six tins for each treatment was fodder-analysed. (*See* footnote).

(*c*) *Discussion of the results of the analyses.*

1. Total Yield of the Various Constituents.

These yields, on a silica-free dry basis, for the cuts analysed, are shown in Table 11.

Governed by the higher yields as the cutting system was made more lenient, up to 5-weekly cutting, the yields of ash, protein, and fibre show progressive increases. Comparing the "eight-weekly" with the "five-weekly," ash is about the same, protein is lower, and fibre is higher. Comparing the "meadow hay" with the "eight-weekly," ash is lower, protein is still lower, and fibre is practically unaltered.

2. Percentage Composition of the Total Herbage.

Calculated on a silica-free dry basis, these percentages are shown also in Table 11.

Ash percentage decreases with lenient cutting, although the "fortnightly" plots show a slightly higher percentage than the "weekly" plots. *Protein* percentage also diminishes with lenient cutting, and *fibre* percentage increases.

If about 20 per cent. protein in the dry matter represents a good quality of herbage, an interval of five to eight weeks between cuts is desirable, and as a satisfactory yield is obtained under such a system, a revision of the methods at present employed in our mowing trials for the testing of manures and water requirements seems necessary. The sole objection to such lengthy intervals between cuts has been the difficulty of taking off the heavy growth at flush periods with the ordinary motor-mower. The use of an auto-scythe (5), would dispose of this objection. A further important bearing of this investigation on our experimental technique is in relation to grazing trials. The majority of our losses of sheep and lambs are traceable to nutritional disorders resulting from a diet over-rich in protein, or the ingestion of harmful organisms when on very short feed, and it would appear that the experiments could be improved in regard to carrying capacity and stock health by lengthening the rest period between grazings, particularly on the Rotational Grazing Test.

Note.—A few cuts in the early stages were not analysed owing to inability to complete arrangements for the work in time.

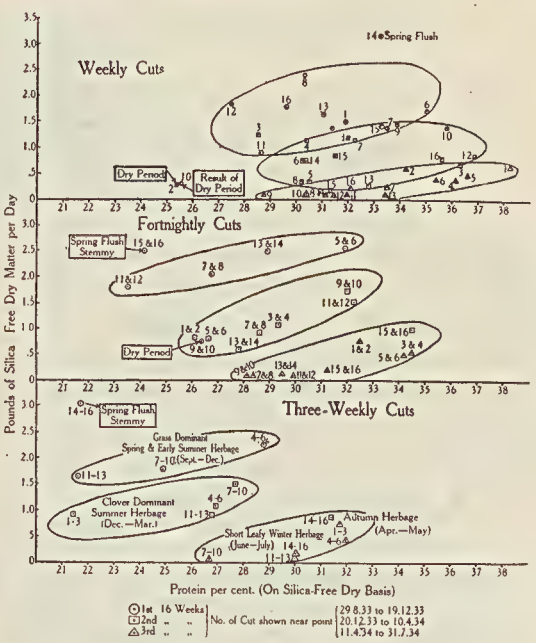


Fig. 3.—The influence of rate of growth, botanical composition and leaf-stem ratio on protein percentage.

3. Factors Influencing the Chemical Composition of Irrigated Pasture Herbage.

At least three factors can be shown to exert a considerable influence on protein percentage, and these are (*a*) Rate of growth, (*b*) Botanical composition, and (*c*) Leaf-stem ratio.

The interaction of these factors is shown for the "weekly," "fortnightly," and "three-weekly" plots in Figure 3.

The graph for the "fortnightly" plots is the clearest example, and although the number of points which could be plotted is small, a positive correlation between rate of production of dry matter and protein percentage of the dry matter is evident for the period ending 19th December, 1933, if the cut made at the end of the 10th week of the first period is excluded. (The cut made at this time on the "weekly" plots is similarly "abnormal," and both represent low yields, due to temporary dryness, in a period of normally high daily dry matter production.)

A similar correlation is evident for the period 20th December, 1933, to 27th March, 1934, and another for the period 28th March, 1934, to 31st July, 1934.

These show the sequence of changes in the character of the herbage—

(*a*) grass-dominance, with high dry matter production by a stemmy, relatively low-protein group of species;

(*b*) clover-dominance, with moderate dry matter production by a high-protein species; and

(*c*) very low winter dry matter production of herbage with a very high leaf stem ratio, particularly in the later cuts of the third period, and consequently a high protein percentage of the dry matter.

The relatively low protein percentage of the spring flush cuts on the various plots is explained by the stemmy nature of the grass-dominant herbage at that time—the stemminess is not allowed to develop on the "weekly" plots to the same extent as on the other treatments, so that cut fourteen in the first period more nearly approaches a "normal" position on the graph than the corresponding cuts on the other plots.

It is unfortunate that it was impossible to obtain fodder analyses for each replicate at each cut, as the scarcity of results detracts from the significance of the graphs, and we can only hope that the second season's results will show similar correlations. The "weekly" plot graph may not appear strongly confirmatory, but it must be allowed that any disturbing factors such as temporary dryness or waterlogging exercise a greater effect on these plots than on the others. The second cut in the second period shows an effect of temporary dryness in a period of normally high production, as in the case referred to previously.

Summary.

This test is being continued for several years to ensure that the results will be thoroughly dependable. At the same time in view of the fact that there is not much divergence from year to year in the production of pasture under irrigation during the watering season if moisture conditions are properly regulated by judicious irrigation, and that it is during the watering season that the greater part of the herbage is produced, it is likely that the first year's results constitute a fairly true indication of the ultimate findings. They indicate that, on the type of pasture described, for relatively high production, combined with a good grass-clover balance, and good feeding quality of the dry matter, an average interval of four to five weeks between cuts or grazings is suitable. Allowing a reasonable latitude in times of heavy production, this interval appears to be the basis for successful rotational grazing on the average dairying block under irrigation.

The further results of this test will be published in due course.

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Constructing a Trapnest (*Continued from page 78.*)

to any special design so long as they are well ventilated. The most important part is the front frame on which the traps are arranged. (See Fig. 3.)

The trap doors are made of plain galvanized iron, and are 8 inches high and 11½ inches wide, with the edges rolled so that they will slide up and down on two pieces of galvanized fencing wire.

The catch is a short piece of wire which hangs loosely on a screw (see Fig. 2). When the sliding door is lifted up, the catch is pulled forward so that the door will rest on it, allowing an opening of about 4½ inches. As the hen enters the nest under this door, she lifts it a little with her back. This releases the catch, and as she goes into the nest the door drops down behind her.

After she has laid, she must be released, and the trap reset. The egg is taken from the nest, and placed in the receptacle (see illustration), and a record is marked on the score card opposite the bird's identification number or colour. One trapnest should be allowed for every three or four birds in the pen.

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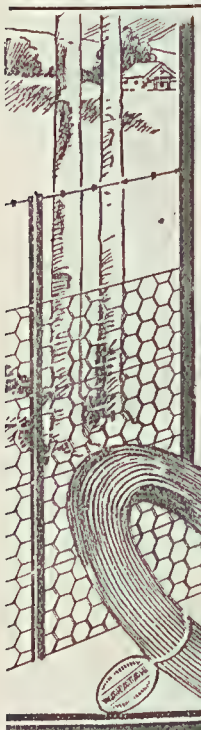

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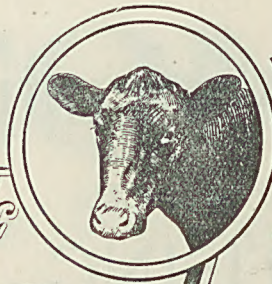

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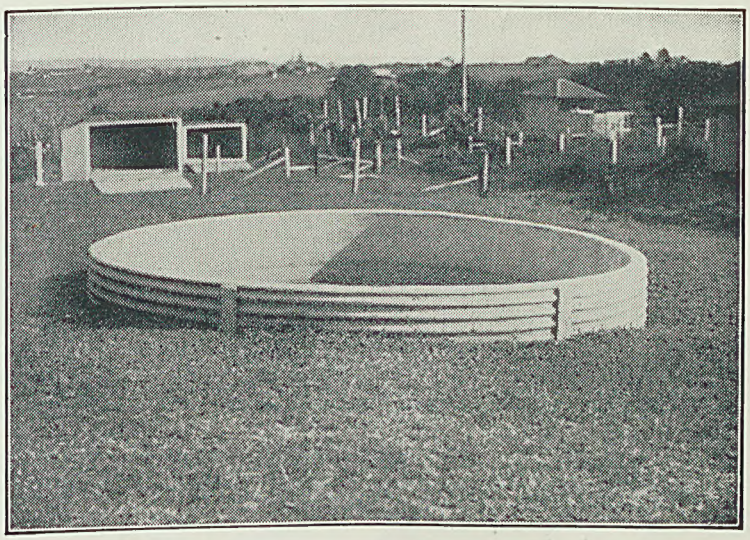

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